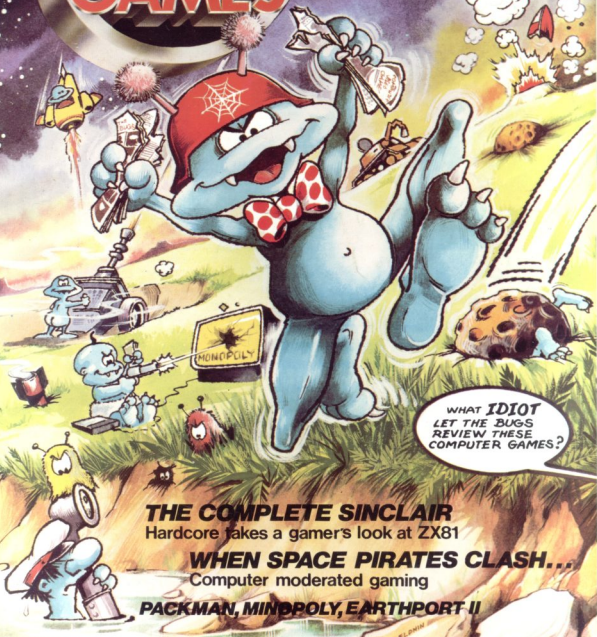


MAY 1982
75p

COMPUTER & VIDEO GAMES



THE COMPLETE SINCLAIR

Hardcore takes a gamer's look at ZX81

WHEN SPACE PIRATES CLASH...

Computer moderated gaming

PACKMAN, MINIPOLY, EARTHPORT II

THE BEST ADD-ON MEMORY MADE FOR YOUR COMPUTER



**VIC 20
ZX81
ATOM
VIDEO GENIE**

**TRS 80
PET
UK 101**

VIC: The VCR-20 is an ultra low power (CMOS) 20K RAM plug-in cartridge, retailed at £54.00 in kit form and £59.00 in ready-built. We can also supply with only 4K of RAM, ready-built at £20.00 and as many extra 2K RAM chips (HM6116) as you require at £5.00 each. No PSU required, beige plastic cover.

The VCS is a cartridge simulator and combines the advantage of the motherboard with two slots and the 8K battery back-up CMOS RAM. This emulates cartridges and adds 8K to RAM. Available end of April in kit form £39.00 and ready-built £45.00.

ATOM: The DUO-1 is the latest 64K memory add-on designed for the Atom, combining very low power consumption (200mA at +5V) and RAM power. This runs, loads and saves 64K basic programs. Kit form £64.00 ready-built £70.00. No PSU required.

ZX81: The SPECIAL RAMPACK is the nicest around, only 3in x 4in cased in a black trim matching case, offers 56K of RAM to make together with the 8K Sinclair ROM the most powerful system in that size. No PSU required. Kit form £54.00 ready-built £60.00.

32K RAM CARD: 48340 bytes free ... for TRS 80 and Video Genie. No PSU required. Kit form £40.00 ready-built £46.00.

64K DRC MODULE FOR PET & UK101: Kit form £70.00 ready-built £80.00.

SEE IT HERE, BUY IT NOW. AUDIO COMPUTERS AT STAND V35 (IN THE ZX81 VILLAGE) AT 'THE COMPUTER FAIR', APRIL 23-25.

All prices are correct at time of going to press — Prices include VAT at 15% and p&p for the UK — Quantity discount available for export and dealers — Order by phone: ZX81, TRS-80, Video Genie and Z80 based: Southend (0702) 613081 — Vic, Atom, Pet, UK101 and 6502 based: Southend (0702) 618144. Telex: 995337 G AUDCOM. Access and Barclaycard. All mail to: **Audio Computers, 87 Bournemouth Park Road, Southend-on-Sea SS5 2JJ.**

News & Reviews

GAMES NEWS18

Fight your way down to the innermost core of Mars, adventure on an alien spaceship and tackle the Gnome House!

VIDEO SCREENS22

A video game from conception to shop display. We find out how cartridges are put together.

ARCADE ACTION30

Tip on playing Qix, World Cup fever and risqué pinball.

REVIEWS82

Pravel around in the Catacombs... Watch out for deadly Falcons.

NEXT MONTH5

Find out about our June World Cup blockbuster.

Listings

MINOPOLY32

The world of property speculation comes to your Sharp MZ-80K for two to five players. For bankers and bankrupts.

EARTH PORT II42

A marvellous docking game on the Tandy TRS-80. Find your way to the orbiting space station and see if you can dock your craft safely.

PUCKMAN44

The ghosts are in the maze and after your blood. Eat your way into our version of the popular Puckman game on a Pet.



DOUBLE CANNON49

Turn your Atari into a shooting gallery and test your marksmanship.

METEOR STORM50

Asteroids on the Apple. Can you take your ship through the dreaded meteor belt.

ANTI-GRAVITY FLYER52

Fly your Nascom to alien planets in this all action space attack game.

SINCLAIR SELECTION58

Four games for your ZX81 in 1K. Avoid the Projectile, Ski, Grand Prix, Earth v. Flying Saucers, for you to key in to your unexpanded Sinclair.

SPIDERMAN60

It's you against the nasty little creatures which always find their way into your bath. But beware! Atom spiders are dangerous creatures and quite capable of defending themselves.

MINOTAUR62

A VIC-20 maze game — all the way from Sweden. Find your way out of the labyrinth.



Fantasy worlds

Computers can make very disciplined opponents but in games of bluff and cunning there is nothing like trying to out-think a fellow human.

COMPUTER MODERATED GAMES (Page 70) give you the best of both worlds, leaving the computer to run through the calculations and judge the outcome of conflicts while humans provide the devious opponents.

Find out how to enter these increasingly popular fantasy worlds — and what's in store for those who do. Also a chance to take part in a game for free.

EINSTEIN-A-GO-GO. More science fiction ideas from author David Langford — complete with a games program listing. (Page 28)

Features

MAILBAG7

A chance to have your problems answered and views expressed.

COMPETITION15

A chance for 15 readers to enjoy a free 18 months worth of play in Starweb.

BUGS17

Meet our newest bug, Lost Memory.

CHESS25

Problems to look back on.

REVERSI27

John Ball begins his column with three rules of thumb.

ADVENTURE65

Keith Campbell's first Sinclair review.

PRACTICAL PROGRAMMING66

Helpful hints and tips for programmers.

GRAPHICS68

Use graphics in your adventures.

DOWN TO BASIC72

All you need to know about Sinclair Basic.

KIT KORNER76

The perfect tool-kit.

BRAINWARE81

Try your hand at our two regular brain-teasers.

SOFTWARE GLOSSARY84

Technical and jargon terms explained.

HARDCORE86

Books, software, peripherals, extra memory... a more complete guide to the ZX81.

Editor Terry Pratt, Assistant editor Elspeth Joiner, Editorial assistant Susan Cameron, Design Linda Freeman, Production editor Tim Metcalfe, Advertisement manager Rita Lewis, Advertising executive Neil Wood, Advertisement assistant Louise Flockhart, Publisher Tom Moloney.

Editorial and advertisement offices: Durrant House, 8 Herbol Hill, London EC1R 5BN. Telephone Editorial 01-278 6556, Advertising 01-278 6552.

COMPUTER AND VIDEO GAMES POSTAL SUBSCRIPTION SERVICE. By using the special Postal Subscription Service, copies of COMPUTER AND VIDEO GAMES can be mailed direct from our offices each month to any address throughout the world. All subscription applications should be sent for processing to COMPUTER AND VIDEO GAMES (Subscription Department), Competition House, Farmdon Road, Market Harborough, Leicestershire. All orders should include the appropriate remittance made payable to COMPUTER AND VIDEO GAMES. Annual subscription rates (12 issues): UK and Eire £10.00 Overseas surface mail £12.00 Airmail Europe £20.00 Additional service information including individual overseas airmail rates available upon request. Published and distributed by EMAP National Publications Ltd. Printed by Eden Fisher (Southend) Limited.

© Computer & Video Games Limited ISSN 0261 3697.

Cover: Elgin Lloyd-Jones

Wherever you are in the UK there's a Genie dealer nearby



Genie I & II Approved Dealers

AVON Microstyle, Bath, 0225 334689/319705. **BEDFORD** Computers, Bedford, 0234 516749. **BERKSHIRE** P.C.P., Reading, 0734 589249. **BIRMINGHAM** Ward Electronics, Birmingham, 021 554 0708. Consultant Electronics, Birmingham, 021 382 7247. A. E. Chapman and Co., Cradley Heath, 0384 66497/8. **BUCKINGHAMSHIRE** Photo Acoustics, Newport Pagnell, 0908 610625. **CAMBRIDGESHIRE** Cambridge Micro Computers, Cambridge, 0223 314666. **CHESHIRE** Hewart Electronics, Macclesfield, 0625 22030. Mid Shires Computer Centre, Crewe, 0270 211086. **CUMBRIA** Kendal Computer Centre, Kendal, 0539 22568. **DORSET** Blandford Computers, Blandford Forum, 0259 53737. Parkstone Electronics, Poole, 0202 746555. **ESSEX** Emprise, Colchester, 0206 865826. **GLOUCESTERSHIRE** Computer Shack, Cheltenham, 0242 584343. **HERTFORDSHIRE** Photo Acoustics, Watford, 0923 40698. Q Tek Systems, Stevenage, 0438 65385. Christalid Systems and Software, Berkhamstead, 044 27 74569. **KENT** Swanley Electronics, Swanley, 0322 64851. **LANCASHIRE** Harden Microsystems, Blackpool, 0253 27590. Sound Service, Burnley, 0283 38481. Computercat, Leigh, 0942 605730. **LEICESTERSHIRE** Kram Electronics, Leicester, 0533 27556. **LONDON** City Microsystems, EC2, 01 588 7272/4. Wason Microchip, N18, 01 807 1757/2230. Premier Publications, Anerley SE20, 01 659 7131. **NORTH EAST** Briers Computer Services, Middlesbrough, 0642 242017. General Northern Microcomputers, Hartlepool, 0783 863871. HCCS Associates, Gateshead, 0632 821924. **NOTTINGHAMSHIRE** Midland Microcomputers, Nottingham, 0602 298281. Mansfield Computers, Mansfield, 0623 31202. East Midland Computer Services, Arnold, 0602 267079. Electronic Servicing Co., Lenton, 0602 783938. **NORFOLK** Anglia Computer Centre, Norwich, 0603 29682. Bennetts, Dereham, 0362 2488/9. **OXFORDSHIRE** Micro Business Systems, Whitney, 0993 73145. **SCOTLAND** Esco Computing, Glasgow 041 427 5497. Edinburgh: 031 857 3937. Computer and Chips, St Andrews, 0334 72569. Scooby Computers, Edinburgh, 031 343 1025. Victor Morris and Co., Glasgow, 041 221 8958. **SHROPSHIRE** Tarrant Electronics, Newport, 0952 814275. **SOUTH WEST** Diskwise, Plymouth (0752) 267000. West Devon Electronics, Yelverton, 082 285 3434. Bits and Bytes, Barnstaple, 0271 72789. **SUFFOLK** Elgielec Ltd., Ipswich, 0473 711164. **SURREY** Croydon Computer Centre, Thornton Heath, 01 689 1280. **WALES** Tryfan Computers, Bangor, 0248 52042. **WEST MIDLANDS** Allen TV Services, Stoke on Trent, 0782 618929. **WILTSHIRE** Everyman Computers, Westbury, 0373 823764. **YORKSHIRE** Advance TV Services, Bradford, 0274 585333. Huddersfield Computer Centre, Huddersfield, 0484 20774. Comprite, Bradford, 0274 668890. Superior Systems Ltd., Sheffield, 0742 755005. Photo Electronics, Sheffield, 0742 53865. **NORTHERN IRELAND** Business Electronic Equipment, Belfast, 0232 46161. Britain Laboratories, Belfast, 0232 28374.



Sole Importers:

LOWE electronics

Chesterfield Road, Matlock, Derbyshire DE4 5LE.
Telephone: 0629 4995. Telex: 377482 Lowlec G.

**NEXT
MONTH**

June will find normally mild-mannered men vehemently pushing forward half-believed theories as indisputable facts. Gesturing wildly with beer-glasses and shouting down conflicting opinions with a bigotry which belies 50,000 years of civilisation.

Yes, you guessed, the World Cup is with us again and love it or adore it — it's difficult to close your eyes to it.

Already the arguments rage with the Hoddle Walks on Water school, battling against the He Couldn't Kick His Way Out of a Paper Bag theorists. Northern Ireland is dogged with the Martin O'Neill question and Scotland — which has seen it all twice before in the last eight years — is gearing itself up for the Jordan or Gray debate.

It's certainly a hot topic in Argentina and probably causing quite a furore in El Salvador. But if the facts don't finally support your views then **Computer & Video Games** can help you take the matter into your own hands.

If you feel England would have qualified from their group if only Greenwood had followed your advice for the team against France then you will have the opportunity to prove it next month when we publish our World Cup Manager game.

You can choose to manage any of the 24 sides, pick your team, play your matches and find out how you've fared. Send out your scouts to watch the opposition, brief your team on tactics, discover the danger men in the opposition and make arrangements to mark them.

Winning with Brazil or West Germany is a hard enough task but anyone who can do it with El Salvador will really have proved their management potential. We think it's a winner, see what you think next month.

● Everyone will be a winner with our World Cup competition. The Silica Shop is putting up the Atari T.V. Games Centre and football cartridge for the first prize but there are also consolation prizes and everyone who enters will receive a £3 voucher to spend at the Silica shop.

Find out how to enter and test your football judgement in our June issue.

HOW WOULD YOU FARE IN THE WORLD CUP?



**NEXT
MONTH**

If the spirit of Adventure is lurking in your veins, you'll find plenty of ideas in our June issue.

We have four very different adventures featuring next month. From outer space thrills in the **Star Wars** mould with **Dog Star Adventure** down to the depths of the earth for a very different kind of challenge in the hunt for **Trolls Gold**.

Or you could **Save the Princess** in another short adventure game for Atom owners.

When the BBC lends its name to a product it has to be special and the microcomputer that bears its name falls into that category.

If you own one already, have one on order, or just have a healthy interest in the machine, you'll want to read our special section on this highly rated microcomputer — including three of the first games created for it.

Commodore's VIC-20 is now in the high streets and selling well. The company is supporting it with some high quality games cartridges and a growing range of peripherals. A complete run-down on this popular micro takes place in next month's **Hardcore** section.

**NEXT
MONTH**

The response to our first issue's free cover puzzle caught us on the hop. This time we think we're ready for you — and we've also set you programmer/puzzlers a slightly more challenging task.

There's another free puzzle, from the people at Pentangle, going on our June front cover and although you won't need a computer to solve it — we hope you'll use one to enter our second competition. Even if you don't win you should emerge a better problem solver for trying.

The Beat-the Bug puzzle will make **Computer & Video Games** stand out even more on your local newsagent's shelves. But why not make sure of your copy by subscribing now.

I would like to take out an annual subscription. I enclose a cheque/P.O. for £10, (£20 overseas) for twelve issues. **Computer & Video Games**, Bretton Court, Bretton, Peterborough PE3 8DZ.

Name _____

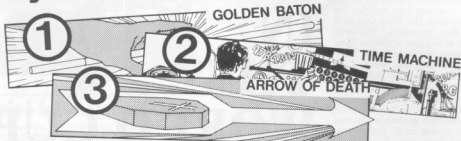
Address _____

**Computer
& Video Games.**
The magazine that makes computers fun.

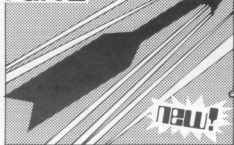
INNOVATIVE TRS 80-GENIE SOFTWARE

from the professionals

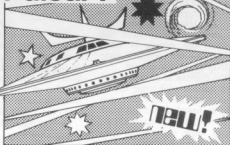
Mysterious Adventure ★★ ★



Arrow of Death Part 2



Escape from Pulsar 7



NOW — The second part of Arrow of Death plus a new Adventure! Escape from Pulsar 7 is the first space Mysterious Adventure. Arrow of Death Part 1, already said to be one of the best 16K Adventures written, is surpassed by the Part 2 edition. Arrow 2 carries on from Arrow 1 but is self-sufficient. In Pulsar 7 you will be delivering Redennium ore to an outer galaxy when you pick up an interesting creature for the intergalactic zoo on your home planet, but what happens when the ore and the animal inadvertently come together?

For the TRS-80 or Video Genie Tape £10.50 inc. V.A.T. & P. & P.
Disk £14.00 inc. V.A.T. & P. & P.



MOLIMERX LTD

A J HARDING (MOLIMERX)

1 BUCKHURST ROAD, TOWN HALL SQUARE, BEXHILL-ON-SEA, EAST SUSSEX.

TEL: (0424) 220391/223636

TELEX 86736 SOTEX G

TRS-80 & VIDEO GENIE SOFTWARE CATALOGUE £1.00 [refundable] plus £1 postage.





Please drop us a line at: Computer and Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB.

THE LOST KING . . .

Dear Sir,
I own a chess-playing computer and always read your page on this game with interest.

In the April issue, I was delighted to find an opportunity to test my own machine by inputting the problems which Max Bramer had illustrated. However the third diagram, which illustrates a problem solved by the Sci Sys Mark V, is missing a black king — no wonder it defied solving by problemists! D. Josephs Oban Scotland

Editor's reply: The diagram is not only minus a black king, it is also the wrong way up. A correct version is printed below which will still prove a real test of any chess problem solvers — or their machines!



LANGUAGE PROBLEM

Dear Sir,
Would you please answer a question for me? I will shortly be getting a Vic-20 which I ordered from the United States. What I would like to know is if programs produced for British standard Vic-20's will run on U.S. standard Vic-20's. Is the Basic the same?

The command I am wondering about most of all is

the colour command. If the Basic is not the same the U.S. Vic would have "COLOR" where the British Vic would have "COLOUR". If this command is different will the tape still load so it can be listed and changes made?

I hope I can use British produced tape as there are many excellent game programs in your magazine for the Vic-20.

Michael B. McAllister
RAF Lakenheath
Suffolk

Editor's reply: You should have no problems Michael as all Vic-20s are imported from the U.S. anyway so there's no such thing as a British standard version. The Basic is standard so you should be able to use British produced games tapes.

WAITING TO INVADE

Dear Sir,
I am very pleased to say that I have thoroughly enjoyed all the issues of **Computer and Video Games** since the first one issued in November.

Every month I look forward to reading your magazine in search of a review or an advertisement for Space Invaders for the Vic-20, but I have been bitterly disappointed every time until your latest issue — March — in which on page 83 I saw an advertisement for it.

I am not too sure whether I should buy.

So could you please help me and all other VIC owners in search of VIC Invaders by providing some information.

K. S. Arom
Tarbock
Liverpool

Editor's reply: The Commodore cartridge Avenger is

one of the best computerised Space Invader games you'll find Mr. Arom. It is available from their dealers at £17.35 + VAT.

GRAPHIC DISPLAY

Dear Sir,
I am writing in the hope of adding enlightenment to all graphically frustrated ZX81 owners.

In reply to DK'tronics advertisement — page 63 of your February edition — I received their 4K graphics ROM. It is a very neat Eprom based circuit that fits under the ZX-81 keyboard.

To date I have converted your Cosmac and Cosmac Landing programs and, by insertion of loops within the program loops, have obtained some hilarious slapstick type movement of wings, arms and legs.

While on the subject of Cosmac Landing may I give my congratulations to the co-authors on an excellent program. More of the same quality please — via a ZX-81 user perhaps?

R. N. Leathers
Bassingbourn
Herts.

MORE FOR THE VIC

Dear Sir,
I am requesting more Vic-20 programs. The Vic-20 computer is becoming more and more popular and may — I dare say? — taking over the ZX-81/ZX-80. I know many people in and out of school who have this box of tricks — I, unfortunately have not — and often have access to the use of a Vic-20 would like to see more games for it using all its qualities — sound, colour and good graphics.

Having all but one issue I have played Pot Shot which I enjoyed but am disgusted

to only see one game, where as the ZX-81 has had six games, Apple computer one and in each issue of your magazine. Do please, please have more games for the Vic-20.

Clive Young
Luton
Bedfordshire

Editor's reply: We will be running more Vic-20 programs Clive, in fact you'll find one in this issue — and we promise not to ignore your favourite machine.

DODGEM DODGE

Dear Sir,
Modifications to allow your November Acorn Atom Dodgems program to run without floating point ROM:

- A) 1125: remove "COLOUR 2";
- 11250: remove "COLOUR 1";
- B) 20, 40, 60, 80: in each alter "S = S + SGN (T-S);" to GOS; S=S+K; and add 30000) K=T-S; IFK=>R R 30010 IFK>K=1:R 30020K=-1:R
- C) During debugging, remove end of line 10000 from ?716=.... (Inclusive)

Tom Boyd
Holmbyr St. Mary,
Dorking,
Surrey.
P.S. D) 11125 should be CLEAR Z, not 3 — Congratulations on an otherwise high standard of bug-free code!

John Dyson replies:
Thank you for your modifications for running Dodgems on a machine without the floating point ROM. It should also be possible for you to run the program in colour by using the routine on page 89 of Atomic Theory and Practice. □

SALE ELECTRONIC GAMES



ATARI T.V.
GAME
THE GAME WITH 50 CARTRIDGES
R.R.P. £129.95 (inc. VAT)
OUR PRICE
£78.22 + VAT
(£79.95 inc. VAT)
The Atari is supplied with 50 different cartridges, a pair of paddles, a pair of joysticks and a combat cartridge and is the most popular television game on the market. It has a range of over 40 different cartridges in addition to the standard Atari range we also now carry the new Adventure cartridges which are currently on special offer reduced from £19.95 to £16.95 inc. VAT

ATARI CARTRIDGES
20% OFF R.R.P.
Atari Soccer £29.95
NOW £23.95
Activision Dragster £18.95
NOW £14.95
Activision Boxing £18.95
NOW £14.95

ATARI OWNERS CLUB — Why not join our *FREE* Silica Atari Owners Club and receive our bi-monthly newsletter with special offers and details of the latest new cartridge releases. Telephone us with your name and address and we will add your name to our computer mailing list.



NOW £50 OFF

MATEL INTELLIVISION

THE ULTIMATE T.V. GAME
R.R.P. (£229.95 inc. VAT)

OUR PRICE
£156.48 + VAT
(£179.95 inc. VAT)

6 NEW CARTRIDGES JUST RELEASED
ASTROMASH • SNAFU • BOWLING
SPACE ARMADA • BOXING
TRIPLE ACTION

All 19 current cartridges + the six new ones above more retail at £19.95 - Since special offer price £19.95 inc VAT

The Mattel Intellivision is the most advanced TV game in the world with a range of over 25 different cartridges at an special offer price of £179.95. This game uses a 16-bit microprocessor giving 16 colours and three pass haviour sound. The picture quality is incredible with 3D effects and realistic animation. An Intellivision console will be available in the Spring 1982 to convert the Mattel into a full home computer with 16K RAM which will be compatible and programmable in Microsoft Basic. Other accessories will be added later in the year. The normal price of the Intellivision + free soccer cartridge is £229.95 but our special offer price is £179.95 inc. VAT saving you £50.00.

MATTEL OWNERS CLUB — Why not join our Mattel Owners Club and receive our regular newsletters containing details of all the latest cartridge releases. Telephone us with your name and addresses and we will add your name to our computer mailing list.

FREE 16 PAGE CARTRIDGE CATALOGUE — If you are interested in owning a Mattel, we now have available a 16 page catalogue describing the latest six cartridges to be released, as well as a new Mattel colour leaflet with brief descriptions of all 25 cartridges. Telephone us for further details.

T.V. GAME CARTRIDGES

We specialise in the whole range of T.V. games and sell cartridges for the following games:
ATARI • MATTEL • ACETRONIC • PHILIPS • DATABASE • ROWTRON • INTERION • TELENG
 Let us know if you own any of these games and we will let you have details of the range of
 cartridges available.

Atterson INTERTON & ACETRONIC owners we have over 75 assorted used cartridges in stock all with 1 year guarantee — **SPECIAL OFFER £8.95 each**

We also have a number of secondhand games and cartridges.

We also have a number of secondhand games and cartridges.



HAND-HELD GAMES
EARTH INVADERS
These invaders are a breed of creature hitherto unknown to man. They cannot be killed by traditional methods — they must be buried. The battle is conducted in a maze where squads of aliens chase home troops. The only way of eliminating them is by digging holes and burying them.
R.R.P. £26.95 NOW £18.95 inc. VAT

R.R.P. £26.95 **NOW £18.95** inc. VAT



ELECTRONIC CHESS
Liquid crystal battery chess computer with 100-200 hrs battery life and two levels of play. Comes with separate chess board and pieces.

NOW £5 OFF
R.R.P. £24.95
SALE PRICE
£19.95
INC. VAT

GRADUATE CHESS
A deluxe version of the electronic chess set with integral chess board. The ideal portable chess set — see illustration.

NOW
£29.95
INC. VAT



PAC MAN 2

Pac Man 2 is based on the latest pub game. It is a two-colour game of strategy. Factors of attack and destruction pit the Pac Man against the large Ghosts. The object of the game is for Pac Man to score as high a score as possible by capturing and destroying Ghosts. Bugs and Energizers without being himself destroyed by the Ghosts. Pac Man 2 incorporates the most modern and complete Atari displays ever produced and is now on release for the first in the UK offering an ideal present.

R.R.P. £34.95 **NOW £24.95** inc. VAT

R.R.P. £34.95 **NOW £24.95** inc. VAT**FIDELITY MINI-SENSORY CHESS COMPUTER**

The very first chess computer of its price to offer a portable computer with integral sensory board. Battery 10-8 hrs or mains operated. This is a modular game and additional plug-in modules are planned for 1982 for advanced chess, popular openings, greatest master games, draughts and reversi.

MINI-SENSORY COMPUTER WITH
STANDARD CHESS MODULE WAS £54.50 NOW **£49.95** INC. VAT

Since Shop are one of the country's leading specialists in Chess Computers and now stock a range of more than 20 Chess Computers, including Challenger 7, 10, Voice, Sensory 8 and Sensory Voice, Diplomat, System 3, Murphy, Great Game Machine, Voice Champion, and the new Sorcys Mark V.



SPACE INVADERS

One of the most popular arcade games, Space Invader™ packs in lots of fun, multi-shaped, brilliant LED lights, including attack ships, bombs, multiple rockets and a beam laser cannon, plus exciting electronic sound effects. The attack ships attempt to bomb the ground defenders as they are moving. Survive the missile rockets — avoiding alien bombs — and destroy the force as quickly as you can. Progressive degree of difficulty includes digital scoring. For ages 5 to adult.

£24.95 **NOW £16.95** inc. VAT

R.R.P. £24.95 **NOW £16.95** inc. VAT

CALL
1/3 THE PRICE OF
COMPARABLE MACHINES

— THE AFFORDABLE ANSWER

The Post Office certified telephone answering machine

"Sorry darling, I will be late home — Love John"

The Call Jetter 1 brings the affordable answer to the amazing price of \$599 (or less) for \$399 for the Call Jetter 2 with built-in remote recall facilities. This amazing telephone answering machine for one Post Office certified and guaranteed for one year. They make a thoughtful gift for home or business use.

Call Jetter 3 illustrated
DOWNLOAD \$399

NOW \$69.00 inc VAT

Call Jotter 3 illustrated **NDW £69.00** inc VAT
TWINAPE £138



NOW **£48.95** inc VAT



**ADD-ON
ADAPTOR**
WAS £199 inc. VAT
SALE PRICE £124
inc. VAT

FOR FREE BROCHURES - TEL: 01-301 1111



SILICA SHOP LIMITED CVC0582
1-4 The Mews, Hathfield Road, Sidcup, Kent DA14 4DX
Telephone 01 301 3333 or 01 309 1111

SILICA SHOP LIMITED CVG0582
1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX
Telephone: 01-301 1111 or 01-309 1111





MAILBAG



SINCLAIR SELECTION

Dear Sir,
I have a Sinclair ZX-81 without a 16K RAM pack, and have bought the last few editions of your generally excellent magazine. My only complaint is the lack of 1K games that you have recently printed.

I think the best idea you can adopt is to print both a 1K and 16K program, pleasing both 1K and 16K Sinclair owners. I am pretty sure that there are many other frustrated 1K owners who would like to see this idea being carried out.
Patrick Morrow
Madeley
Shropshire

Editor's reply: We feature four Sinclair 1K games in this issue Patrick and we hope you'll enjoy playing them. And yes, there will be a 16K game coming up in the near future.

SOUND ADVICE

Dear Sir,
I read in your Sounds column of the December issue of **Computer & Video Games** that: "It is always possible to connect the computer to your hi-fi auxiliary inputs and thereby obtain amplified sound".

I have a Tandy TRS-80 Level II 16K microcomputer, and only recently, quite by accident, discovered that it had a sound facility.

At the Tandy shop I was advised to buy a small amplifier with a 3" diameter loudspeaker. They said that a direct connection from the tape outlet to my hi-fi would be dangerous, as spike outputs from the hi-fi could damage the computer chips, and this was later confirmed when I contacted a friend who is very knowledgeable in these fields.

Yet at another shop a salesman, when I was discussing the purchase of a non-U.H.F. V.D.U., said that he could incorporate the sound facility in a converted U.H.F. television by making a one-wire connection across

the DIN-plug video output on the computer.

I am now quite bemused. I would like to purchase such a converted U.H.F. television, as I would then have the advantage of portability together with a sound facility, but I would also like to use my hi-fi at home, as I would get much better sound. But I fear that either course might lead me to accidentally damaging my computer. Can you advise?

Leslie Tebb,
Bradley,
Huddersfield.

David Annal replies:
It is always wise to consider any damage that might be done to a computer by connecting it to anything else. The safest method of avoiding trouble is to separate the computer completely from the following circuit.

This can be done by using opto-isolators. These are small light-proof chips containing a light emitting diode and a light sensitive transistor. Information is transmitted by light and no physical connection exists between the two circuits. This method is ideal for driving relays, thyristors, plotters, etc., but the fidelity is not high enough for good sound transmission.

Another way is to use some form of buffer circuit such as a Darlington driver chip like the 307-109 from Radiospares. Unfortunately there are seven drivers on one chip and eight lines out from the average computer bus! By interspersing an extra chip between the computer and the outside world, all that could happen would be the need to replace this and not one of those in the computer itself.

A much easier way to protect the computer is to simply use a series resistor. Any computer line configured as an output should ALWAYS have a series resistor placed immediately in the wire next to the computer port before any external circuit is connected to it.

Resistors of 1K are usually adequate, but in the case described above, one of 100K is better and will not affect the output overmuch. Place this in series with the signal

wire from the cassette port, or DIN socket, and no harm should come to the computer.

Note, however, that some hazard can arise when connecting T.V. sets direct to the computer other than via the usual UHF aerial socket. Many such sets have a "floating chassis" which is not earthed. To earth it through the computer digital ground or by taking a line direct to the earth pin of your mains is highly dangerous, however, a competent T.V. engineer should be well aware of this point.

READER'S APPEAL

Dear Sir,
You have a great magazine but I feel I must complain about the programs sent in by some readers.

I own a ZX-81 and ardently keyed in the program for Reversi, featured in your March edition. This I did despite there seeming to be an error in the machine code statement, where is the 3Q's in line 5?

Why is there such apathy among the ZX-81 owners, after all I have managed to key in and successfully run programs for other computers, after changing them to ZX-81 basic.

Congratulations on an otherwise excellent magazine.
P. J. Jinks,
Chessington,
Surrey.

COSMOS FAULT

Dear Sir,
I have enjoyed playing your Cosmos Landing program very much and was able to correct the mistakes pointed out in your March issue without any great difficulty. I am surprised however to discover that Mr Wiel has not also spotted what I would consider as a major routine fault. The variable I assigned in lines 130-140 has no effect whatsoever on the descent rate. The fault lies in line 320 and I found replacing this with LET

S=S+1/1 very effective in solving the problem. I am not sure that this is the original line intended, but I feel that the fault should be made known to your other readers as it improves on otherwise brilliant game.

S. W. Stewart
Westway Gardens
Belfast

DEFENDER ON APPLE

Dear Sir,
I read in the January issue of **Computer and Video Games** the articles on the arcade game Defender, which interested me greatly, as I play the game myself. As I have access to an Apple II computer, I was wondering whether you might know if a version is being brought out on a disc or cassette in the foreseeable future, or even if a similar game is available. I hope you can help me with my query.
J. S. Heppell,
Ingatstone,
Essex.

Editor's reply: There is an Apple II version of Defender on sale in the UK. It is an American written game by Sirius Software and you can obtain a copy of it from most Apple software dealers, including SBD Software of Richmond. The game is called Gorgon and according to the latest price list it costs £24.95.

AMERICAN DREAM

Dear Sir,
We are considering going to America for our holidays this year. Is it possible that if we buy an Atari 800 computer — which costs a lot less in USA — we can use it in Britain with our T.V. system?

Also is there duty payable at Customs, if we declare the purchase of such a computer — or are they exempt? Adrian Morris
Cardiff

Editor's reply: Sorry Adrian, the American Atari 800 is not compatible with the British T.V. system — so your American dream will not be coming true.



FROM THE BATTLEZONE

Dear Sir,

To my mind, people are attracted to arcade games subconsciously, for they often get out far more than they put into these computers.

Take Atari's Battlezone. It caught my eye in a fish'n'chip shop because of the XY monitor with vector scans, and the prodigious amount of maths the computer gets through in real time. In case you haven't met it, it's a fighting tank simulator in which you drive around a valley dodging missiles and rocks. Everything is portrayed in full perspective, right down to the missiles flying longer to distant targets.

A kind man let me mend one. There's a 6502 riding a 12K bit-logic, plus four custom bit-slice chips doing 16-bit trigonometry, among the 150 other support devices. She certainly puts out more than you put in. At a guess the software came out of the backdoor from NASA, Boeing and Lockheed.

Thought your readers might be interested. Jonathan Pope
Chesterton Road,
Cambridge.

JUMBLED ADVENTURE

Dear Sir,

I have an Atari 400 computer with a microtex 32K card in it. Please could you help me with a problem I have. When I run Scott Adams adventure games, 1, 2, and 3, 90 percent of the time when I run the games they are all right, but sometimes when I press the return key, the screen is covered with jumbled-up letters and then after about two seconds, the screen either goes black or yellow and black with machine code symbols.

The only way out of this is to turn the power off and to start again. I have also tried the games on an Atari 800 and the same thing happens.

I would just like to congratulate you on the marvelous reading that your magazine offers.

Mr J Harrison,
Millbrook,
Southampton.

Editor's reply: I'm afraid that you either have a faulty cassette containing the game, or a faulty computer. I suggest you take your computer to your supplier and get him to give it an overhaul to see if anything is wrong.

Unfortunately, the Microtex 32K card is not one which either Atari or Ingersoll supports for use with the Atari.

If you have not already tried returning the games to the supplier in case they are at fault, it would be a good idea to do so.

TUNE IN TO THE BBC

Dear Sir,

I have ordered a Model B, BBC microcomputer which is due in March. Please could you inform me whether a BBC Users Club is planned to be formed in the near future?

Jonathan Freeman
Finham
Coventry

Editor's reply: Here are a couple of addresses you may find useful Jonathan.

The ZX-80/81. Acorn Atom and B.B.C. Micro-user Club can be contacted by writing to Tim Hartnell, 44/46 Earls Court Road, London W8. This club produces a magazine called Interface which includes programs for the B.B.C. micro.

The Beebug User Group can be found at 35 St

Julians Road, St Albans, Hertfordshire and D. E. Graham is the person to contact.

COUNTING ON COMMODORE

Dear Sir,

As most people know, the Commodore's Pet computer uses a cassette recorder for storing programs on tape. This is very inconvenient, if you have a long program to save or load.

This is a drawback we have to put up with, but another problem, which crops up when saving programs on tapes, is how to find programs in the middle of a tape.

This problem can be overcome by using a tape counter, so it is possible to record the number the program is at. Will we be likely to be seeing Pet computers with tape counters, in the near future?

Andrew Zucker,
Finchley,
London.

Editor's reply: Your idea for a tape counter is a good one, but Commodore claims it has beaten you to it. I don't know what make of cassette recorder you have but the standard Commodore compatible one is the C2N which already has a counter.

SOUND AND VISION...

Dear Sir,

Well, I'm lost for words! All I can say is that yours is one fantastic magazine. But also even with all your excellent advice I am still

unable to create my dream game, which, when finished I might let you see. To tell the truth I haven't started yet but with your help, who knows?

I am presently using an Apple II. I have searched the manuals high and low in order to find some good sound effects. All I have achieved so far is a loop around a line like PEEK (-16336) - PEEK (-16336) + PEEK (-16336).

Are there any other ways of getting sound from the Apple because this sounds horrible. Not exactly your ideal laser gun sound.

I am also experiencing problems in High Res Graphics. I am presently using a shape from a shape table with the command.

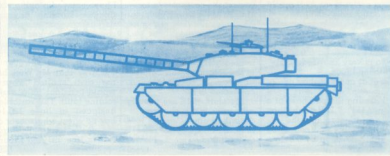
DRAW 1 AT 10, 10

This works fine but I would like to know how to make the shape move by pressing a key on the keyboard and for that shape to continue moving until that key is released. Another problem I have is how to make the aforementioned shape explode or disappear when touched by another shape e.g. a missile.

Is there any way your dedicated readers could help me and I'm sure many others like me? Please, please write in because I'm really desperate.

I'm sure many readers with Apple's without paddles would like to know how to convert the Dotlight by Mark Pelczarsk in the February issue in to a keyboard operated version.

Paul Caine
Exeter,
Devon.



TECHNOMATIC LTD

Dept. C&VG,
17 Burnley Road,
London NW10 1ED.
Tel: 01-452 1500/450 6597
Tlx: 922800

Retail Shops:
15 Burnley Road,
London NW10.
305 Edgware Road,
London W2.

All prices are exclusive of p&p & VAT.
Barclay/Access cards accepted.
Minimum telephone orders £5.

YOUR ONE STOP SHOP FOR PERSONAL COMPUTERS, ACCESSORIES, SOFTWARE & COMPONENT REQUIREMENTS



HARDWARE

1K Ram (2 x 2114 low power) £2 F.P. ROM £20. Buffers:
74LS244 £0.70, DP8304 £4.50, BILS95 £0.90, Via 6522 £5.00.

CONNECTORS

BUS: Plug £3, sct £4, PRINTER: Plug £2, sct £2, VDU: Plug
£0.90, sct £0.90, Centronix Type 36 way connector £6.50

MEMORY EXPANSION

8K SRAM + up to 16K eeprom or 16K SRAM can be populated as
you progress. PCB: £11.50 (incl. interfacing data).
64K Dynamic RAM card (expandable to 128K). Fits inside the
case. Std 1.8A PSU adequate. Built £95.00 p&p 75p.
ATOM colour encoder card £32.00.

ATOM

Basic built £135, Expanded 12K + 12K £180 (£3 p&p/unit)
1-8A 8V ATOM PSU £7 3A 5V regulated PSU £22 (£1.50 p&p).

SOFTWARE/FIRMWARE

Toolbox-ROM: Many new exciting commands incl. uprating
cassette read/write level to 1200 baud and visual indication
whilst loading. Price incl. instruction manual £25.00.

ATOMSOFT

Games Pack 1-10, Maths Pack 1-2, Soft VDU, Chess, Desk
Diary, Fourth, Data Base etc. £10.00 each. Word Processor
ROM and manual £26.00
Fruit Machine, Break Out, Disassembler UFO Bomber, Pinball
£3.50 each. 747 Flt Simulator, Invaders, Galaxian, Chess
£7.00 each.
BOOKS (no VAT): "Getting Acquainted with your Atom"
£7.95. "Atom Magic" £5.95. "Atom Business" £8.95. P&p
book 70p.

NOW AVAILABLE

SEIKOSHA GP100A PRINTER

- Full graphic capability
- All modes can be mixed
- Double width characters
- Self test printing
- 116 characters

£199

EPSON MX 80 F/T

- 80 CPS bi-directional travel
- High resolution graphics
- Condensed, emphasised, enlarged characters

£350

12in BMC MONITOR with Green Screen 18MHz £140

SEND FOR OUR DETAILED ATOM LEAFLET

ZX81

UPGRADE YOUR ZX81 WITH A PROFESSIONAL KEYBOARD

One piece 47 key full travel keyboard module fully built with flexible connectors
ready to plug into ZX81. No soldering or desoldering necessary £33 + £1 p&p.
An attractive anodised custom made case to house our keyboard and the ZX81
pcb £13.00 + £1 p&p.



Your ZX81 could look like
this

EXPANSION ACCESSORIES:

MOTHERBOARD: This board provides the most economical and reliable way of fitting two add-on boards plus the RAM PACK.
On board voltage regulator drives all external boards and overcomes the overheating problems £10.50. Female to female
connector £5.50 (to connect ZX to motherboard). Female to male £5.50 (to allow remote positioning of RAM pack and other
add-ons).

3K STATIC RAM BOARD for ZX80/81 £16.00

HIGH RES GRAPHICS BOARD (256 x 192 Pixels) 6K RAM on board. Resident software in ROM provides extremely fast hi-res
facilities which include MIXED TEXT and GRAPHICS. Screen can be copied to printer £75 + £1.50 p&p.

ZX SOFTWARE

DEFENDERS, ASTEROIDS, £5.50 each. INVADERS/PLANETOIDS, NIGHTMARE/MUSIC, DRAGON MAZE/LIFE £6.05 each.

CONSTELLATION £7.00, DICTATOR £7.80, STAR TREK, BUMPER 7 £4.30 each and more

WIDE RANGE OF ZX BOOKS IN STOCK.

SEND FOR OUR DETAILED PRICE LIST.

home
computers

Atari's expanded to 32k Doubles the memory



**400 with
32k of RAM
only £345**
excl. VAT

SPECIAL FEATURES

- One cartridge slot.
- Ridged pressure sensitive keyboard.
- Recessed system keys.

£345.00 excl. VAT



**800 with
32k of RAM
only £575**
excl. VAT

SPECIAL FEATURES

- Expandable via plug-in cartridge to 48K.
- Two cartridge slots.
- Full typewriter style QWERTY keyboard.
- Monitor jack for use with high quality monitors or VCS machines.

£575.00 excl. VAT

STANDARD FEATURES 400/800.

- 6502 central processor unit.
- 10K ROM Operating system, 8K ATARI Basic.
- Four game controller sockets.
- 16 colours each having 8 different luminosities.
- 4 sound generators with four octave sound range plus volume and distortion Controls.
- High Resolution graphics, 7 modes, highest resolution 320 x 192.
- Control for up to four disc units.
- Control for printers, peripherals and communication devices.
- Alternative languages, e.g. MICROSOFT, PASCAL, etc.
- Full screen editing.
- Plugs into your own television.

Tape deck—for 400 & 800 £43.48 excl. VAT. Joy stick controller £11.26 excl. VAT.

Le Stick £21.74 excl. VAT. Software Ask for details of our extensive range of software

Goods required

Price

Add £4.00 post, packing and insurance for special deal and £1.00 post, packing and insurance for all other items. Add 15% to all prices for VAT

Total £

Name:

Address:

C.V.

MAIL ORDER to: Adda Home Computers Ltd.
FREEPOST, London W3 6BR or telephone your
order (24 hours a day) to 01-862 9504 quoting your
Visa, Access or American Express number

*I enclose a cheque, made payable to Adda Home Computers
Limited for

£

*Please charge my Visa/Access/American Express account. My account
number is

*Please add my name to your mailing list

*Delete as applicable

Date

SHOP ADDRESS: Adda Home Computers Ltd.

154 Victoria Road, Acton, London, W3
(near North Acton tube station)

Te 01-862 9504

OPEN 10am-5pm (Tuesday-Friday).

10am-5pm (Saturday)

TERMS AND CONDITIONS: All goods sold subject to Adda terms and conditions of sale. Full details available on request, but include 7 day money back guarantee. Adda 12-month hardware warranty. Please allow 21 days for delivery. Allow 7 days for personal cheques to be cleared. Quoted prices are exclusive of VAT

adda-

PLAY FOR TODAY

COMMODORE VIC



- Colour ● Sound
- Programmable Function Keys
- 5K Memory Expandable to 32K
- Standard PET/II/ASIC ● Full sized Typewriter Keyboard
- Graphics Character Set ● Plug-in Program Cartridges
- Low Priced Peripherals
- Self Teaching Materials

£189.95

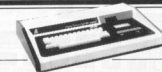
VIC Compatible Cassette **£44.95**

ACORN ATOM



- 8K Ram + 4K Ram ● Sound
- 20 Introductory Programs
- Built-in Colour

£199.00



TRS80 MODEL III

- 48K User Ram ● Extended Microsoft Basic
- Parallel or RS232 Interfaces
- With 40 Track Single Density Disk Drives
- With 80 Track Double Sided Disk Drives
- With 80 Track Double Density Drives 1.4MB

£1596.00

£1741.00

£1999.00

VIDEO GENIE I

- Machine Language monitor
- Sound and Lower Case
- Renumber and Screen Print

£344.00



TEAC DISK DRIVES

- Interfaces with Video Genie, North Star Horizon, Supertrain Nascom etc.

● 80 Track Single Disk Drive **£259.00** ● 80 Track Double Disk Drive **£448.00**

● 80 Track Single Disk Drive **£344.00** ● 80 Track Double Disk Drive **£599.00**



SHARP MZ80K

- 48K User RAM
- Extended Basic
- Integral Cassette

£399.00

THE COMPUTER SHACK

Computer Shack Ltd, 14, Pittville Street, Cheltenham, Glos. Telephone: (0242) 584343

Credit available through major credit company.

Access or Barclay Card Accepted, Mailorder Enquiries Welcomed.

Prices include VAT

ATOM

Special Offers

ATM1	Atom assembled 2Kram 8Krom	£165.60
ATM2	Atom assembled 12Kram 8Krom	£188.60
ATM3	Atom Family Pack (Atom + PSU + PAL)	£197.80
ATM10	Atom kit 2Kram 8Krom	£132.25
ATM11	Atom kit 12Kram 8Krom	£155.25
ATM22	Atom 4K Floating Point rom	£21.85
ATM25	Atom PAL Colour Encoder	£43.70
ATM26	Atom Power Supply (1.8A)	£9.66
ATM51	6522 VAI Decoder	£7.36
ATM52	LS244 Printer Buffer	£0.92
ATM53	Atom DIN to DIN cassette lead	£2.30
ATM54	Atom 10K ram set	£23.00
ATM55	Atom 1K ram set	£2.30
	Acornsoft cassettes (normally £11.50)	£10.81
ATM164	Introductory Pack (4 cassettes)	£20.70
BBC21	Upgrade Model A to B	£115.00
BBC1	Model A 16K BBC Micro	£329.00
BBC2	Model B 32K BBC Micro	£399.00

Prices inc. of VAT and Postage. All in stock except BBC available in 4 to 5 weeks

ELECTRONEQUIP

128 West Street Porchester
Hants PO16 9XE
Tel 0705-325354

WHY COME TO US

BEST VALUE FOR MONEY
ALL ITEMS FULLY TESTED
WIDE RANGE AVAILABLE
INSURED GUARANTEES

OUR 'EXPERTISE' CAN HELP YOU

**BRAND NEW MZ80A
NOW IN STOCK**

Also PC1211 pocket computer, MZ-80B & IBM personal computers, EPSON, SEIKOSHA and OKI printers, ALL AT SIMILAR LOW PRICES.

Programs & packages of all kinds e.g.:- Asteroids, Space Invaders, Simon, Music Composer, Cribbase, PASCAL, Road Runner, Mother Ship, etc.

CALL US NOW Most Credit
01-643 4290 Cards Taken

Croydon Micros

202, Stanley Park Road,
Carshalton, Surrey. SM5 3JP
(Prices exclude VAT & delivery) (CV2)



MORE POWER TO YOUR POCKET!



THE FX702P. A pocket computer that communicates in BASIC language.

AVAILABLE AT SPECIALIST CASIO CALCULATOR OUTLETS.

CASIO WHAT WILL THEY THINK OF NEXT?

CASIO ELECTRONICS CO. LTD., UNIT 6, 1000 NORTH CIRCULAR ROAD, LONDON NW7.

Handled alphanumeric programmable—BASIC language—holds up to ten different programs simultaneously—subroutines nested up to ten levels—program looping up to eight levels—simplified program editing and debugging—variable programming capacity: between 1680 steps with 26 memories and 80 steps with 226 memories—55 single key routines including log, trig and hyperbolic—built-in routines include standard deviation, regression analysis and correlation coefficient—all programs and memory data retained even when switched off. Comprehensive library with over 70 program examples. Optional FA2 adaptor for program storage on cassette and F710 printer.

R.R.P. £109.95

THE SYMBOL OF VALUE

NASCOM

KEYS	
Nascom 1, with NAS-515 16K RAM	£112.50
Nascom 2, no user RAM	£252.50
BOARD LEVEL	
Nascom 1, with NAS-515 16K RAM	£126.00
Nascom 2, no user RAM	£238.50
CASED SYSTEMS	
Nascom 3, no user RAM	£338.40
8K user RAM	£36.00
16K user RAM	£95.50
32K user RAM	£193.50
48K user RAM	£117.00
POWER SUPPLY	
429.35	

MEMORY CARDS

RAM 8 memory card with 16K RAM	£72.00
RAM 8 memory card with 16K RAM board	£96.00
Additional 16K RAM	£13.50
Additional 32K RAM	£27.00

I/O BOARDS

I/O boards for 3 x P10, 1 x CTC, 1 x UART	
800 to P10	£40.50
P10 for above I/O	£10.80
CTC for above I/O	£12.40
UART for above I/O	£14.40

Nascom single disc drive (350KB incl. FDC card)	£423.00
Nascom dual disc drive (350KB incl. FDC card)	£414.40
NAS DOS disc system	£40.50

SOFTWARE

NAS-515 16K RAM	£18.80
NAS-515 32K RAM	£18.80
Z8AP 2.1 for NAS	£26.30
SYS 1.4 + EPROM	
Z8AP 2.1 for NAS	£22.50
SYS on tape	
Basic on ROM	£18.80

ATARI

800 Computer	
400 Computer	
Recorder	
Disk Drive	
16K RAM	
Joystick (opt)	
Blank Diskettes (5)	
Assembler Editor	
Space Invaders (ROM)	
User Routines (ROM)	
Maths Command (ROM)	
Asteroids (ROM)	
Invitation to Programming (I)	
Invitation to Programming (2)	
Trick Typing	
Conversational French	
Conversational German	
Conversational Spanish	

TAPES

Blank CT2	£4.00
Tapes (6 mm cassette)	10 for

SHARP MZ80K (48K RAM)



SUPAVALUE

SHARP PC1211



SUPAVALUE

ATARI 800 (16K RAM)



SUPAVALUE

APPLE

Apple II 48K	
Disk drive with controller	
Disk drive without controller	
Parallel printer interface	
High speed serial interface	
Colour card	
Apple Printer	
PASCAL language system	
Managerial printer	
Blank diskettes	

ACCESSORIES FOR APPLE

(Not Apple Manufactured)

16K RAM card	£85.00
Z80 processor card	£85.00
CPM disk & manual	£28.75
80 column board	£162.50
Display switch	£18.00
Test extension	£8.00

BOOKS

Computers for Everyone	£6.00
Science & Eng.	
Prog Apple II Ed	£11.40
Apple BASIC Data	£6.95
File Programming	
Make a success of Micro-computing in your Business	£4.95

APPLE

Heads BASIC Games	£11.50
Intro to PASCAL	£11.50
PASCAL 77 book	£13.95
The 2-80	£11.95
Your First Computer	£7.75
4802 Applications Book	£10.25
Advanced BASIC	£8.95
Apple II User's Guide	£11.10
Basic BASIC	£8.95
BASIC Business Software	£7.05
BASIC Computer Games	£3.95
BASIC Comp Programs	
in Science & Eng	£8.55
BASIC with style	£6.95
BASIC A self teaching guide	£5.95
CPM User's Guide	£10.10
Coloured	
Game Playing with BASIC	£8.20
Getting acquainted with your Apple	
Instant BASIC	£7.95
Instant BASIC	£8.75
Apple II 2	
Beginner's Book	£3.50

APPLE

Micro 161 1

Basic Concepts

Microsoft BASIC

More BASIC Games

£8.75

£6.25

£7.95

Apple II 2

Apple II 2

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

£7.95

ITION COMPETITION COMP

Would you make out as a berserker

Do you see yourself as a Berserker, spreading fear through the galaxy with your army of life-crushing robots?

All those now in a state of confusion should turn straightaway to page 70 for enlightenment. If you have already digested our double page spread on computer moderated gaming then you will be ready to carry on.

Flying Buffalo's U.K. agent, Chris Harvey is offering 15 Computer & Video Games readers the chance to take part in a special free game of Starweb.

It's special because the company is promising a fast turnaround so you'll be able to see the results of your orders without having to wait the usual four weeks.

The computer is running off the first few turns of the game, so that you begin the game already involved in the action. We will also be following your fortunes in the magazine with a regular column devoted to the deals, battles, hopes and fears of the players.

If you would like to join in, write, telling us which of the six character types you would like to play: Berserker, Apostle, Pirate, Artifact Collector, Empire Builder or Merchant.

Choose a species name for your race which fits the character type you have decided on.

And the first 15 imaginative names we receive will be given a place in the game. We also need your name, address and telephone number but most importantly we need 15 people who will make the deadlines for orders, not lose heart if their system is invaded by a fleet of Berserkers and be willing to write the occasional piece about the game for inclusion in the magazine. So be quick off the mark with your letter.

We need your games

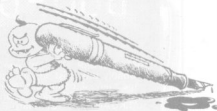
Calling aspiring games writers:

If you think your games deserve a wider audience then send them in to us with instructions, a list of variables, and other helpful information to aid our readers in the understanding of the game.

No matter what machine you want to write on, we'll try and get around to publishing your game. A printout is what we will eventually need but we can make do with a tape — which also helps us try the game out — and get the game printed from that.

Our thanks to all those who have sent games in to us so far but there are some machines we would like to continue to support and we are running short of good games for.

Remember we pay £10 for each listing published and there's also a chance of winning a trip to Paris if your game is voted the best of the year.



Confessions of a Bug

There are times when we Bugs surprise even ourselves. The February edition offered the Tandy TRS-80 game of Grand Prix which generated innumerable phone calls from readers who claimed various assorted gremlins in the program — but we never touched it! Honest!

The most popular theory expounded was that disc based instructions made it impossible to run with a cassette. But after thorough testing (a Bugs' curse on John Gibbs of Dover) it has been proved to everyone's satisfaction that the game works perfectly well on both disc and cassette.

The problems seem to relate to the data statements and making sure you distinguish between a "B" and an "8" in these. Also check the letters "D" and "O" in the program. A program which includes a line to check the data entry is available from Computer & Video Games for anyone still having problems with this game.

The ZX81 Poker game in our April issue caused plenty of phone calls from observant programmers who spotted an IF statement in line 3530 with no THEN attached.

The line is correct as far as it goes but continues:
=J(4)ANDJ(2)+2=J(3)+1 THEN LET T4=1234

This game does in fact work without the missing line until you get three of a kind up — and so slipped through the rigorous testing the editor put it through.

The Moon Lander caused a few problems as a rogue symbol appeared in the printout in line 360. It was a colon — as most of you seemed to guess. The line should read: 360?I=-?1:128.N.

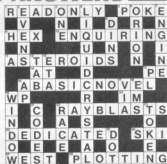
yours Mal

BRAINWARE ANSWERS

The answer to our April Mind Routines problem is 1789 bags divided as follows: first man 589, second man 477, third man 393 and fourth man 330.

The correct solution to last month's Nevera Crossword is printed right and the winners' names will be published in next month's issue.

For more puzzles to tax your mind turn to page 81 for this month's Mind Routine and Nevera Crossword.



BUG-BYTE

**B.B.C. MICRO
ZX81**

**VIC
ATOM**

B.B.C. MICRO

SPACE WARP The ultimate Star-Trek game — High resolution colour graphics, sound, real time. Probably the most sophisticated Trek type game available. Supplied on cassette together with a 16 page manual, command reference chart and function key labels.

For model B BBC Micro — price £11.50.

BACKGAMMON Standard Backgammon game for both model A & B. Fast computer responses. Playing instructions included. £8.00

THE BEEBON A new magazine devoted exclusively to users of the BBC Micro, containing tested programs, features on programming, hardware etc., reviews and much more. At least three substantial programs in each issue, written by professional programmers. Published every two months starting in May. Annual subscription (6 issues) £7.50.

ATOM

Chess	12K	£9.00	Backgammon	8K	£7.00
747	12K FP	£8.00	Lunar Lander	12K	£5.50
Invaders	12K	£8.00	Golf	6K FP	£5.00
Galaxian	12K	£8.00	Disassembler	4K	£4.00
Breakout	4K	£4.00	Typist	6K	£4.00
Pinball	6K	£4.50	Last run	7K	£3.00
Star Trek	12K FP	£5.00	2K programs 1, 2 & 3	(each)	£4.50
Labyrinth	12K FP	£7.00	FP = FLOATING POINT ROM NEEDED		

ZX81

ADVENTURES	The Damsel and the Beast	£6.50
	Dictator	£9.00
	House of Gnomes	£7.00
	Star Trek	£5.00
UTILITIES	ZXAS Assembler	£5.00
	ZXDB Disassembler/Debugger	£6.50
	RENUM Renumbering program	£4.00
GAMES PACKS	Program Pack 1 (1K)	£3.50
	Program Pack 2	£3.50
	Program Pack 3 (1K)	£4.50
	Program Pack 4	£4.50
	Program Pack 5	£4.50
	Program Pack 6	£4.50
	Program Pack 7	£5.00
OTHERS	Constellation	£8.00
	Whist	£4.00
	Multifile	£17.00
	Invaders	£4.00
	1K Breakout	£4.50
EDUCATIONAL	Videograph	£7.50
	Tables teaching and testing	£6.00

VIC

VICMEN	(For the unexpanded Vic)	£7.00
ANOTHER VIC IN THE WALL	(Breakout-unexpanded)	£7.00
VICGAMMON	(3K expansion)	£7.00



ACCESS/BARCLAYCARD ORDERS ACCEPTED
ON 24-HOUR SERVICE ON 051 227 2642



All prices inclusive. Dealer discounts available.

PLEASE SUPPLY:

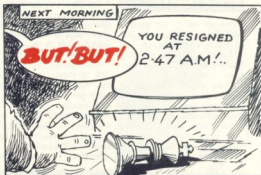
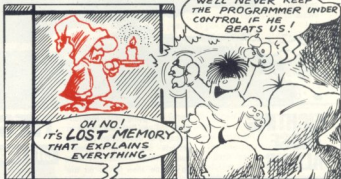
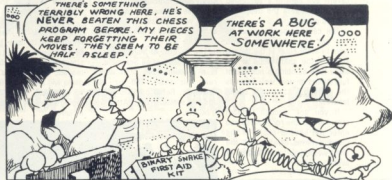
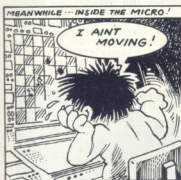
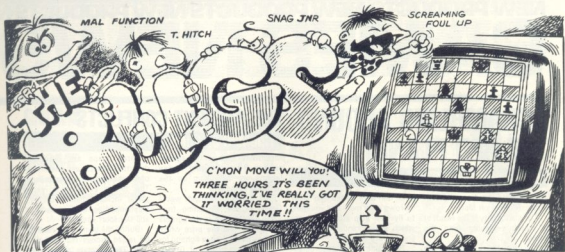
NAME ADDRESS

I ENCLOSE A CHEQUE/P.O. FOR:

OR, PLEASE DEBIT MY ACCESS/BARCLAYCARD NUMBER:

SIGNATURE:

BUG-BYTE, 100 THE ALBANY, OLD HALL STREET, LIVERPOOL L3 9EP.



NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW GAMES NEWS

SCRAMBLING AROUND THE RED PLANET

CAVERNS OF MARS

On a trip into space you discover a massive hole on Mars.

The giant cavity is the result of a meteor crashing onto the planet.

You decide to explore the cavern and control a spaceship on a journey into the depths of the red planet.

The cavern soon narrows as you get underground and you have to steer clear of the jagged sides of the shaft while at the same time bombing a number of fuel dumps on your way down. Is the game starting to sound familiar?

If you get through without crashing into the rocky sides you enter the second phase of the game. Swarms of aliens fill the shaft which you must destroy or avoid.

In the third phase the shaft narrows even more and you have to fly your ship around barriers which appear randomly. Hit one and you are dead.

The game becomes progressively more difficult in the following three phases. The game ends when you successfully land your ship on the pad at the bottom of the shaft.

The Caverns of Mars — based on the Arcade game Scramble — is a creation from Atari which runs on their 400 or 800 machines. Retail price is £29.95 and it's available from Atari distributors.

THE ANCIENT CONFLICTS

TRIUMPH OF ROME

Meanwhile back in the second century BC the mighty Roman legions are advancing on the Seleucid Kingdom.

The Seleucid Kingdom was a Greek Empire stretching from north-east Greece to the borders of India — and the prize which the two nations were fighting for was the domination of Greece and the cities on the western coast of Asia Minor.

In this game you relive this ancient battle for power. Improvements have been made to the program logic to make the simulation of warfare more realistic and decisive. A typical game will take about three hours to complete, and a facility for taping a partially finished game is included.

Three maps are provided depicting Greece and the areas of Asia Minor on the Aegean Sea. The forces available to each player include infantry, cavalry, elephants, siege artillery warship and transport vessels.

During the game taxes have to be raised, troops recruited and paid. The program also covers naval encounters, land battles and sieges — and takes account of the various capabilities of different troop types in varying circumstances.

Triumph of Rome runs on a TRS-80 in 16K and comes from Molimerx of Bexhill-on-Sea. It costs £13.51.

FIGHTING THOSE ALIENS...

SPACE FIGHTER

Aliens are out to get you and your chances of survival are slim as you fly a space cruiser over undulating terrain dodging enemy fire coming from all directions.

There are five varieties of aliens out to get you and you must avoid being shot down by these nasty characters.

Some move straight towards you, some move down the screen and some diagonally.

Your defence is a laser cannon,

and if the going gets really difficult and you feel your ship is in jeopardy of destruction you can activate one of three smart bombs. These immediately blow up all the alien forces on the screen.

The game is similar in concept to the popular arcade game Defender which has frustrated many players. It's written in machine code to speed up the on-screen action.

There are six skill levels and with 10 phases to get through this tough, compulsive game could get you hooked to your Atom monitor.

Space Fighter runs on a 5K Atom with 3K graphics facilities. It comes from Leeds based Atom specialists, Program Power and costs £8.95.

THESE MEAN STREETS

CITY ENCOUNTERS

Big cities may lure you to taste their delights with bright lights but within them hidden dangers lurk.

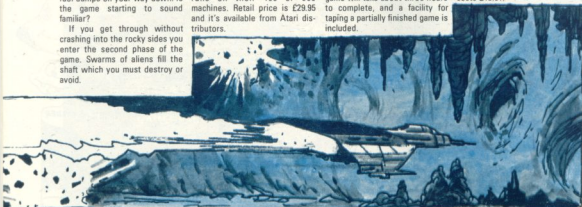
Stepping away from the traditional setting of Adventure games City Encounters takes place in a concrete jungle. The action takes place in buildings, cellars, garages and down dark alleyways.

The object of the game is to see how you survive in the city. At the beginning of the game each player is allotted various physical attributes including strength, intelligence, and alert-

ness. The computer also gives players with a run-down on their family background, social standing, financial condition.

A special feature of the game is that at any time you can check out where other players are. A description of how the players are getting on is displayed on the screen.

City Encounters is the follow-up to another Adventure, Random Dungeon Generator, produced by Molimerx of Bexhill-on-Sea. It comes in tape form for the Tandy TRS-80 in 16K. The price is £17.10.



NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW GAMES NEWS

GNOME FROM GNOME

HOUSE OF GNOMES

In the House of Gnomes are rooms containing dangers which Superman would be loathe to tackle.

You have to venture round the rooms of the house picking up objects on your way. When you have collected them all without coming to any harm you emerge as the winner, beating the computer.

But hazards abound in the House of Gnomes to prevent you from winning. The gnomes themselves are evil creatures and are waiting to taunt and challenge you. A snap decision is needed to accept the challenge and defend yourself, or to try and bribe them.

This game comes from Bug Byte of Liverpool and runs on the 16K Sinclair ZX-81. It costs £7.

Soon to be released from the same firm are a series of cartridges for the ZX-81 which plug into the machine. They are full K eeproms which means that if you only have 1K memory the cartridges will upgrade the memory space giving you a much better game.

Games on the way are Break-out, Pinball, Invaders and a 3D maze game. The cost of these has not yet been decided but is expected to be £13 or £14.

TORTUOUS TUNNELS

Wandering through twisting tunnels and underground caverns you can find yourself in all sorts of trouble deep within the circuits of your Atom.

In this game, simply named Adventure, the object is to rescue a beautiful princess from her captors and collect a total of seven treasures on the route.

You will find yourself in a network of caves, a forest, a desert land, and tortuous tunnels during your quest. You wind up in a castle which is filled with evil creatures ready to strike you down given the slightest opportunity.



WE'RE UP FOR THE - WORLD - CUP

With the World Cup looming on the horizon football is stepping into the computer games limelight.

Texas Instruments is keeping up to date with its Five-a-Side Soccer cartridge for the TI99/4A computer. It sticks closely to the real game with penalties and fouls. Only one player has possession of the ball at any time but the opposition can tackle and take the ball into play for his own team. He's not always successful and a slip of the joystick could mean you end up a goal under.

To shoot or pass the ball you have to press the fire button. You

SOCCER

can speed up the ball by pushing the joystick upwards for a fast ball. There are several variations of the game and it includes the facility to choose the length of the game and play injury time. You have to score as many goals

as possible within the time limit.

Graphics in the game are good but the action of the players seems slow. Full sound is incorporated into the game.

Five-a-Side Soccer is available through TI distributors including Currys and Dixons and is priced at £24.95.

WARPED ENTERPRISE

SPACE WARP

Captain James T. Kirk, Mr Spock and the rest of the Enterprise crew are going boldly where no computer game has gone before — into the heart of the BBC microcomputer.

Space Warp, one of the first games on sale for this sought-after computer is based on the popular television series, and one of the oldest computer games, Star Trek.

You have to venture into various sectors of the galaxy, spread before you on a grid. Located within the grid are various space craft, some belonging to unfriendly space warriors and some controlled by allied forces. You can also locate refuelling ships which are vital on your voyage through the stars. And of course the Klingons are there in force, ready to destroy you.

A 16 page booklet accompanies the game tape giving you

detailed instructions of how to play.

Bug Byte's Space Warp runs on the Model B machine and you'll need over 16K memory. The game costs £11.50.

The Liverpool firm is making a big push into the BBC market, producing compatible software and has plans to bring out a magazine for BBC micro owners.

ILLUSTRATIONS: JOHN DAVIS

ADVENTURE

You must make a snap decision either to go into combat with them, or try and win them over by offering bribes.

Adventure runs on a fully expanded 12K Atom and has taken Program Power about three months to produce because the firm used a special programming routine which allows sentences to be condensed so that you can have a larger vocabulary without needing to store more words in the memory banks. It is priced at £8.95.





Please add
VAT to all prices

ANNOUNCING THE MZ80A A SHARPER SHARP PHONE FOR OUR PACKAGE DEALS £549 Incl. VAT

FEATURING

- ★ Professional keyboard and numeric pad
- ★ Green Screen with fast display
- ★ Scrolling up or down
- ★ Reverse video
- ★ Reset switch
- ★ External volume and brightness control
- ★ Auto repeat on all keys
- ★ Improved Basic printer command and error codes.

PHONE
NOW
FOR
LATEST
KUMA
PRICES

UTILITY PACKAGES FOR MZ-80K

APOLLO WORD PROCESSOR	£24.95
MEMORY TEST	£5.50
CASSETTE DATABASE	£29.50
BASIC EXTENSIONS	£13.00
ARDENSOFT TOOLKIT	£35.00
CP/M KIT	£150.00
ZEN EDITOR/ASSEMBLER	£19.50
SHARP EDITOR/ASSEMBLER	£45.00
ZEN-DOS DISSASSEMBLER	£37.50
SHARP MACHINE CODE TAPE & MANUAL	£22.50
CRYSTAL BASIC	£40.00
SUPER COPY	£10.50
PROGRAMME FILING INDEX	£5.50
MUSIC COMPOSER-EDITOR	£10.50
DOUBLE PRECISION BASIC FOR THE MZ80K DISC SYSTEM	£40.00
PASCAL (CASSETTE)	£50.00
MZ80-K CALC CII (FINANCIAL MODELLING)	£34.50

MZ80-K MANUALS & ACCESSORIES

MZ80-K DUST COVER	£9.95
BASIC 5025 MANUAL	£7.00
SERVICE MANUALS	
MZ80-K	£7.50
MZ80-I/O	£5.00
MZ80-P3	£7.50
MZ80-FD	£10.00

Software
authors
contact
us

NEW
PROGRAMS
PLUS
MZ80K BOOKS

The
Point of
this Ad. is
SHARP

Kuma Computers

Kuma computers: 11 York Road, Maidenhead Berks.
phone: Maidenhead (0628) 71778/9 Telex: 849462 TEL FAC.KUM

MZ-80B SOFTWARE (CP/M Applications & utility software Basic-80, Basic compiler, Fortran-80, OS Cobol, Wordstar, Mailmerge, minimodel, Pro-Pascal, Basic, Macro-80, etc. etc.)
PHONE US FIRST FOR FULL CATALOGUE

GAMES FOR THE MZ-80K

ANIMATE	£5.50	LUNAR LANDER	£5.50
BLOCKADE	£5.50	MAP OF ENGLAND	£5.50
BOMBER	£5.50	MASTERMIND	£5.50
BREAKOUT	£5.50	MZ MAZE	£5.50
CAMELOT	£5.50	MONEY CLIMB	£5.50
CAROLS	£5.50	MORTAR ATTACK	£5.50
CATCH 2000/INVADER	£5.50	PATIENCE	£5.50
CHESS	£10.50	POKER	£5.50
COMBAT	£5.50	PONTOON	£5.50
CONCENTRATION	£5.50	PRINCESS MAZE	£5.50
COSMIAD	£8.00	3D	£5.50
CRIBBAGE	£10.50	QUADRAX	£5.50
DONKEY DERBY	£5.50	RACING	£5.50
ELECTRONIC ORGAN	£5.50	RACE TRACK	£5.50
ENIGMA	£5.50	RAIDER	£5.50
EVASION	£5.50	REACTOR	£5.50
EXECUTIVE	£8.00	ROAD HUNTER	£8.00
EXPLORING AFRICA	£5.50	RHYMES	£5.50
FALL OUT	£5.50	SHAPEMATCH	£5.50
FIREBALLS	£5.50	SHARP DEMO	£5.50
4 IN A ROW	£5.50	(GRAPHICS)	£5.50
FRUIT MACHINE	£5.50	SHOW JUMPING	£5.50
GRAPHICS	£5.50	SNAKES & LADDERS	£5.50
MUSIC PACK	£5.50	SPACE BATTLE	£5.50
TYCODYN	£5.50	SPACE INVADERS	£5.50
GUESS WORD	£5.50	SPACE PURSUIT	£5.50
GUN	£5.50	STAR TREK	£5.50
HANGMAN	£5.50	STOMPER	£5.50
HEAD ON	£5.50	SUBMARINE	£5.50
HOME BUDGET	£5.50	SUPER FIRE	£5.50
HUNTER KILLER	£5.50	SUPER SIMON	£5.50
INTRUDER	£5.50	SWOHDMAN	£8.00
J.S. LINE 4	£5.50	TANK WARR-WALL	£5.50
LARGE DISPY	£5.50	TEN PIN BOWLING	£5.50
LIFE	£8.00	TRADER SMITH	£8.00
LUNAR	£5.50	U.F.O	£5.50

EDUCATIONAL PACKAGES

MUSIC COMPOSER EDITOR	£10.50
TIMETABLING AID	£19.50
CHILDRENS' MATHS	£5.50
ELECTRONS	£10.50
WAVES	£10.50
CECIL	£14.95
FRONT PANEL	£11.50
AS THE CROW FLIES	£11.50
BROWNIAN MOTION	£10.50

AND MUCH MORE COMING!

Trade
enquires
welcome

NEW PRODUCTS NEW PRODUCTS NEW PRODUCT GAMES NEWS

JUST LIKE THE REAL THING . . .

A new space invaders style game for the Sinclair ZX-81 has overcome some of the limitations which hampered the game in the past.

Written in machine code the on-screen action is very rapid. The firm behind this version,

INVADERS

Quicksilva, has tried to emulate the original game as much as possible, even to the extent of introducing a random flying saucer which — if hit — scores mystery points.

The aliens speed increases as their numbers deplete. There are three shields for your firing base to hide behind and a bonus blaster is given after you successfully wipe out five sets of invaders — just like the real thing.

Filling the screen are seven rows of 13 invading aliens, and you can try out your expertise using any of the three skill levels of the game. The lower skill levels of this version seem very slow, but when it reaches the complicated stage the invading

hordes move across the screen with alarming speed.

Also incorporated into the game is a facility to store the highest score run up by one player, along with that player's name.

Quicksilva also produce a character and sounds board for use with this game. The graphics are very realistic, particularly the aliens. Sounds add an extra dimension to the game and as you can use the board with other games, it is worthwhile investing in one.

You'll need a ZX-81 with a minimum of 7K RAM to play QS Invaders, which costs £5.50. Excellent value for money!

WATCH OUT — THERE'S A ROBOT ABOUT!

VOYAGER

Stuck in space on a strange space cruiser your job as a cosmic commando is to disable the alien ship and destroy the power generators.

First you must locate the generators which are the ship's power source. You get a three-dimensional picture of the interior of the ship and you are armed with weapons to blow-up the power supply. Only when you have done this is your mission accomplished.

There are bands of security robots that are programmed to

detect any foreigner on board the ship.

In addition to 3D graphics the game comes with full sound.

Voyager is supplied by Avalon Hill UK and it is available for a number of different computers. Currently you can buy it in cassette form for £12.95.

It runs on the TRS-80 Colour Computer and standard TRS-80, PET, Apple — both requiring 32K memory — and Atari 400 and 800 with 24K. Disc versions will be on sale for the Apple (48K) and Atari (32K).

ALIEN GUNSLINGERS

CRAZY SHOOT-OUT

Unless you're handy with a six-shooter you'll never escape from the deadly room filled with hordes of alien creatures.

There are two exits from the room but you can only escape when you have shot the aliens lurking in the room.

You move your man around the room picking off the slow-moving creatures. For each one you kill you are rewarded with a number of points. When all the aliens turn green you know there are only 10 left to get rid of.

You can angle your shots left or right, up or down. If you need to you can take diagonal aim at the creatures.

The first wave of beasts is the easiest. After wiping them out, you make your man run out of one of the exits — taking care not to bump into any of the deadly radioactive walls.

Then you begin the second phase, and things get tougher. The aliens shoot back at you and increase in number. Each stage gets more difficult as the aliens fire back at you with increasing rapidity.

Crazy Shoot-Out comes from the newly formed Mapsoft subsidiary of Southend based Maplin Electronics. This maddeningly addictive game costs £29.95. It runs on the Atari 400 or 800 personal computer and is an American non-Atari imported cartridge.

CURVED BRICKBATS...

BREAKOUT

This version of the popular arcade Breakout game features a curved bat.

The idea is the same as the original game. Your task is to keep a ball in play by bouncing it off your bat. Using the joystick to control the movement of the bat.

At the top of the screen are several layers of coloured bricks which you must dislodge with the ball. For each brick you knock out you are rewarded with a varying number of points, depending on the layer which the brick comes from.

If you miss the ball and don't catch it on your bat it automatically goes out of play. You get three balls to play with. After you have lost the third one the game ends.

Breakout is the latest addition to Bug Byte of Liverpool's range of software for the Vic computer priced £7.00.



TV GAMES CENTRES TV GAMES CENTRES TV GAMES VIDEO SCREEN

WHERE THINGS GO BUMP IN THE NIGHT...

Things tend to go bump in the night when you are venturing into a haunted house via your Atari Video Computer System.

Haunted House is the latest game brought out by Atari and it marks a change of tack for the firm. Until now there has only been a limited adventure game for the VCS as Atari concentrated its expertise on arcade games.

An adventure game already exists in the range based on the classic Dungeons and Dragons game. But it all takes place visually rather than in the written form used by computers with more memory space than the VCS.

In this game you control a man who walks through the house which is in complete darkness.

HAUNTED HOUSE

The house is riddled with ghosts and ghoulies which you have to avoid or destroy. Which ever is easiest for your own safety.

You ask simple questions which the computer answers by moving you graphically on the screen. Objects which you discover also appear and can help you in your travels. Usually you can keep useful things which could help you out of trouble, like

a length of rope or a weapon. You can also acquire some money or other valuables which can be used for bribing any hostile characters you come across.

In Adventure games you only have one life to play with, unlike arcade games when you are given more. So you have to be extra careful when moving into various rooms.

A good plan to follow is to

draw a map as you investigate the house, and describing what you found in different rooms. This is a help when you move to a different location because you can look back and ensure you don't go to the same place twice or make the same mistakes more than once.

Haunted House is available through Atari's UK distributors and it costs £29.95.



FANCY A BITE?

Pacman seems to be the hero of the video screens this year with many of the maze games on the market.

The latest games centre to be afflicted is the G7000. Philips has named its version Munchkin because of the small blob with the big mouth who whizzes around the screen devouring anything in his path.

With Munchkin on the screen are three Munchers — which pursue the Munchkin — and 12 Munchies. Each Munchie is worth either one point, or three

MUNCHKIN

points if he is flashing when Munchkin eats him.

Using the handset controls you move Munchkin around the paths of a maze. If your Munchkin swallows a Muncher he earns five points for the first one. For the second you score 10 points, and 20 are up for grabs for a third.

The Munchers are only vulnerable when the Munchies are flashing different colours.

All three Munchers have an in-built secret weapon which allows them to recharge their energy. In the centre of the maze is a rotating chamber which they use as their headquarters.

When one of the Munchers is gobbled up by Munchkin it transforms into a ghost. In ghost form the deceased Muncher heads for its base and a few seconds later he reappears hungry for more action.

The game gets more difficult as it progresses. Once your Munchkin has got rid of the 12 Munchies the maze momentarily clears of its inhabitants. Then another batch of them material-

ise on the screen for your Munchkin to continue eating. With each new wave the Munchies speed up making it harder for you to catch them.

There is a facility to record the current and the highest score.

There are four different standard mazes to play in, plus another four mazes whose walls disappear when Munchkin is moving. If Munchkin bumps blindly into a wall the maze flashes on the screen for a few seconds for him to get his bearing.

You can also make up your own mazes by deleting or adding lines to the standard mazes.

Munchkin is available from G7000 stockists and costs about £20.

CENTRES TV GAMES CENTRES TV GAMES CENTRES VIDEO SCREEN

When you relentlessly hammer your video centre to death take a breather to ponder over who brought it to life with video games.

Before you plug a video game into a console unit it has been through up to six months nurturing by a team of designers and programmers.

Video games emerge in their final form after several stages and *Computer and Video Games* talked to expert games designer Chris Horseman of Wembley based Centaurosoft to find out what those steps are.

Often it is the games designers themselves who think of the original idea for a game, but he is always willing to listen to and develop ideas other people come up with.

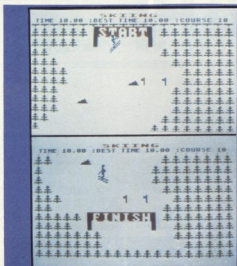
An idea for a game as innovative as Space Invaders is rarely discovered but ideas are always being tossed around in the design room. Chris Horseman, who worked on the Atari games produced by Thorn-EMI, gets his ideas from watching television, existing arcade games which serve as inspiration, and taking a theme and developing it.

He will pick up a subject, often to do with sport, and develop it. For instance the Atari game Jumbo Jet Landing was the result of that method.

The recent invasion of video games based on space encounters is becoming repetitive and sometimes dull. That is why designers are trying to get away from that theme. "I'm working on little animals at the moment," Chris said, "and am trying to think of good games based around them." Judging by the popularity of recent arcade game Frogger and Centipede he is on the right track for a winning formula.

The essence of a good video game lies in two sections. It must be visually attractive, which doesn't mean the screen has to be cluttered with graphics that serve no purpose. It means the graphics should be interesting and the screen colourful. And perhaps more importantly there must be an element of human engineering. "That means there must be something in a game that you don't always see," he explained.

Remember the flying saucer



BEHIND THE SCREENS

which flies across the screen at random intervals during Space Invaders? That's an example of human engineering. Because you never know when it will appear, and because it represents a high points score, the hidden element makes the game more compulsive.

Then the designer must decide exactly what the game will consist of keeping within the realms of programming feasibility.

Drawing doodles may be an idle pastime for you but to Chris it is a crucial job. "Even though I sometimes do them on the train they are a very important stage in making a video game."

He roughly draws a square box representing the screen and fills it with a game idea. Currently working on a ski-ing game he had drawn on the screen the slopes and different landscape possibilities, the skiers positioning in relation to programming, and the

graphics which have to be used.

Once he has arrived at what looks like a viable game the designer takes the proposals to the marketing experts. "The real headache is marketing," moaned Horseman. "The marketing people aren't enough in tune with the market. If they are they will probably react to a game in the same way as the consumer."

The decision to carry a game's idea through to production lies with the marketing chiefs so it is imperative that the designer can show them a clear picture of that game.

From there it goes into the hands of the programmer. Now it is up to him to translate the game to the screen. Usually he spends about three months

solidly programming, six months if the game is an exceptionally complex one.

It is often inevitable that a game will change during the programming stage, as the programmer can spot little additions to improve the game as it appears on the screen.

"Some change quite a bit from the original concept, but it depends on a programmer's creativity." A good games programmer should have a creative mind and the ability to see what can improve a game, or what detracts from the game.

According to Chris, finished Atari games are exactly the same as the original design. This is because Atari works on a system of very strict documentation which the programmer uses like a manual.

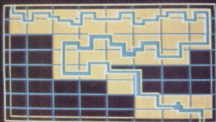
"It's a very strict system with notes that the programmer must stick to at every stage. He must also keep to the time scale laid down in the documentation."

Problems in programming video games centres lie in the lack of memory capacity. "They have a very limited memory so the programmer has a very difficult task to do."

"That's why the programmers have to know the machine inside out to program for it." That is why the only two firms to set up as independent software suppliers for the Atari VCS, Activision and Imagic, are experienced ex-Atari employees.

Once the programmer has got the game running from start to finish the designer photographs each stage of on-screen action and puts the pictures in a "story book" which he uses as ammunition to convince the marketing heads of the game's viability. Usually the games are tested informally on the employees and often their children, who are often good judges.

The cost for a big firm could run to £10,000 but smaller firms can cut spending and bring the figure down by at least half.





16K RAM, full features at an economic price.

£299.00



16K to 48K RAM, superb construction modular design, full stroke keyboard.

£599.00



65K data storage on a 5 1/4 inch floppy disk.

£345.00



Dot matrix printer with 6 typefaces plus graphics capability

£550.00



Digital track plus audio track for simultaneous commentary on some programmes

£50.00



Bi-directional 40 column printer.

£265.00

We stock full range of accessories inc:- RS232 Interface Module, 16K RAM Expander Modules, Joysticks, Paddles, Cables etc.

All Prices include VAT.

LONDON'S LARGEST STOCKS OF ATARI SOFTWARE

We carry vast stocks of all available software suitable for the ATARI Personal Computers. Our staff will be pleased to assist you in selecting the computer programmes for your machine.

Educational Pilot														
Room		£49.50	Basketball	ROOM	£24.50	Telink 1	ROOM	£14.95						
Room		£49.50	Blackjack	ROOM	£8.95	Mortgage & Loan	ROOM	£11.95						
CC		£11.95	Computer Chess	ROOM	£24.50	Payroll	DISK	£95.00						
CC		£18.95	Missile Command	ROOM	£29.95	Sales Ledger	DISK	£149.95						
CC		£18.95	Space Invaders	ROOM	£24.50	Purchase Ledger	DISK	£149.95						
CC		£32.50	Star Raiders	ROOM	£29.95	Keyword	DISK	£95.00						
CC		£32.50	Super Breakout	ROOM	£29.95	Visicalc	DISK	£119.95						
CC		£32.50	Humpty Dumpty & Jack			Home Financial Management	CC	p.a.						
CC		£32.50	Hickory Dicky Dock & Bee	CC	£19.95	DS2 Manual	CC	£8.95						
CC		£14.95	Big Black Sheep	CC	£19.95	Technical notes	CC	£16.95						
DISK		£16.95	British Heritage Jigsaw			Operating system listing	CC	£10.95						
CC		£11.95	Puzzles			DS1 Listing	CC	£3.00						
CC		£11.95	European Scene Jigsaw	CC	£19.95	ROM = Compact Cassette								
CC		£8.95	Puzzles	CC	£19.95	ROM = Plug-in ROM cartridge								
CC		£8.95	Darts	CC	£19.95	DISK = Floppy Diskette								
ROOM		£34.50	Cribbage & Dominoes	CC	£14.95									
DISK		£49.50	Snooker & Billiards	CC	£19.95									
ROOM		£24.50	Tournament Pool & 8 Ball	CC	£19.95									
CC		£8.95	Jumbo Jet Pilot	CC	£29.95									
CC		£8.95	Submarine Commander	CC	£24.50									
CC		£8.95	Superclubs & Tilt	CC	£14.95									
ROOM		£29.95	Commercial Word Processor	DISK	£85.00									

STOP PRESS:
34 MORE PROGRAMMES!
New range of Azan APX Analogue Programme Exchange Software were just arrived.
Prices from **£9.95**

STOP PRESS:
34 MORE PROGRAMMES!
New range of Atari APX American
Programme Exchange Software just
arrived.
Prices from **£9.95**

The West End Atari Centre.
REW Video Products Ltd., 114-116 Charing Cross Rd.,
London WC2. Tel: 01-240 3386.



Access, Barclaycard, Amex, Diners plus Instant Credit Terms



CHESS



Everyone knows computers can play chess — but they are also very able problem solvers.

An intriguing type of problem on which little work has been carried out so far is the *retrograde analysis* problem. These problems, unlike conventional ones — with requirements such as "White to play and mate in three moves" — are concerned only with the past history of positions.

A recent collection of retrograde analysis problems by the American logician Raymond Smullyan was presented as a series of chess detective stories, entitled *The Chess Mysteries of Sherlock Holmes*.

Here is a — relatively simple — example invented by Smullyan.

It is Black's move. The White King has accidentally fallen off the board. The problem is to place it back on the correct square.

At first glance, this problem seems unsolvable, or rather, there seems no reason why the

moved his King away from b3 — to a3 for example, but not a2 where it would itself be in check — discovering check by the Bishop on a4.

Unfortunately on b3 the White King is in double check by the Black Rook and Bishop. What was Black's previous move?

There is no possible Rook or Bishop move by Black which produces the required double check configuration, apparently another example of an imaginary check. In fact, however, this one is only "pseudo imaginary"



FIG 2

since the desired effect can be achieved by an *en passant* Pawn capture. Figure two shows the position shortly before.

Black has just moved his Bishop to give check. The game continues 1. c2-c4, b4 x c3 *en passant*; 2. Kb3 x c3, giving figure one. Thus, the White King originally stood on c3.

This example illustrates a number of important features of retrograde analysis problems.

Firstly, the phrasing of the question does not immediately suggest that any backward analysis of the position is necessary, but the problem cannot, in fact, be solved otherwise.

Secondly, it is crucially important to think of asking the right questions.

Care must be taken with imaginary checks; a move may have involved a capture — including an *en passant* capture; a piece on the eighth rank may represent a promoted Pawn.

It is important to note that retrograde analysis problems

are generally not concerned with strong sequences of play, or even sensible ones, but merely legal ones. Underpromoting, that is turning an eighth rank pawn into something other than a queen, is quite legal (even likely) in these problems.

A researcher at Bristol, Brian Alden, has recently written a program which solves quite a number of retrograde analysis



FIG 3

problems and later I will look at this in some detail.

In the meantime here are two more problems for you to consider. The problem given in figure three is quite simple. To program the solution to this and the previous one you have to write a reverse legal move generator.

The rightmost Pawn in figure four is not a printing error. It is deliberately placed halfway between the g file and the h file.



FIG 4

The problem here is: does the Pawn stand on g2 or h2? It is White to move and as a cryptic hint, you are given that there have been no "underpromotions". Brian Alden's program solves this problem — can you do as well? Solution next month.



FIG 1

King cannot be on any one of many possible squares. The key to the solution is to notice that the Black King is in check.

Since White moved last, what move did he make to give check? If the White King were on h3, say, it is impossible to "unmake" any previous White move which takes Black out of check.

This is an example of what is known as an *imaginary check*. Since the initial position is known to be legal, the only possibility is that White has just



ZX-81

ZX-80

**QS DEFENDER.**

UP - DOWN - THRUST - FIRE
First and only full screen display.
Software to drive QS SOUND BD.
Moving Planetary surface. Up to
84 fast moving characters on
screen at once. On screen scoring.
Ten missiles at once. Increasing
attack patterns. Requires 8K
ROM, and 4K min of RAM. **£5.50.**

QS SOUND BD.

A programmable sound effects
board using the AY-3-8910. 3
TONES, 1 NOISE, ENVELOPE
SHAPER. + TWO 8 BIT I/O PORTS.
Easily programmable from
BASIC, the AY chip does most of
the work leaving your computer
free for other things. Signal O/P
via a 3.5 mm Jack socket Ports O/P
via a 16 pin I.C. Socket. **£26.00.**

QS CHRS BD./

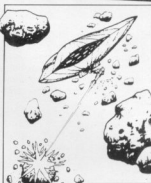
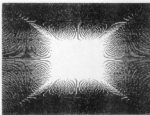
A programmable character
generator giving - 128 SEP-
ARATELY PROGRAMMABLE
CHARACTERS. ON/OFF SWITCH.
1K ON BOARD RAM. Enables
creation and display of your own
characters to screen or printer.
Demo cassette of fast machine
code operation routines and lower
case alphabet included. See below
for ZX PRINTER listing **£26.00.**

QS - LOWER CASE

abcdefghijklmnopqrstuvwxyz

**QS INVADERS.**

LEFT - RIGHT - FIRE
13x7 INVADERS; High score; 3
levels of play; RND saucers; Bonus
base; Drives Sound bd. & CHRS bd.
Requires 7K RAM, 8K ROM + Slow.
£5.50.

**QS ASTEROIDS**

LEFT - RIGHT - THRUST - FIRE
Software to drive QS SOUND BD.
Multiple missiles firing in 8
directions. On screen scoring.
Increasing number of asteroids.
Full mobility of ship to all areas of
the screen. Two asteroid sizes.
Bonus ship at 10,000 points.
Requires 8K ROM, 4K min of RAM
+ SLOW function. **£5.50.**

QS 3K RAM BD.

An extremely reliable static RAM
Bd. which combines with the
computer's memory to give 4K -
total. Plugs direct in to the rear
port on your ZX Computer.
£15.00.

QS MOTHER BOARD BD. & QS CONNECTOR.

A reliable expansion system
allowing a total of any RAM pack
plus two other plug in boards to be
in use at once. On board 5V
regulator drives all external
boards. Fitted with two 23 way
double sided edge connectors.
Connector is 2x23 way edge
connns soldered back to back.
Expansion can operate in two
ways - (1) COMPUTER ↔
CONNECTOR ↔ Any QS add on bd.
(but no extra RAM pack). (2)
COMPUTER ↔ CONNECTOR ↔
MOTHER BD ↔ ANY RAM PACK.
(2 bds to fit in mother bd.) Mother
board **£12.00** Connector **£4.00.**

QS HI-RES BD.

A Hi-res graphics board giving -
256 x 192 PIXELS. 6K ON BD.
RAM. SOFTWARE SELECT/
Deselect MIXED TEXT AND
GRAPHICS. 2K ON BOARD ROM.
Resident fast machine code
graphics software (in ROM)
provides the following HI-RES
Commands - MOVE x, y; PLOT x,
y; DRAW x, y; BOX x, y; UP, DOWN;
LEFT, RIGHT; PRINT A\$; SCROLL;
BLACK, WHITE CLEAR COPY. See
above for ZX PRINTER listings
using COPY. **£85.00.**

Special offers & news

(1) QS Mother bd. + connector + CHRS bd. + The special Graphics version of
ARCTIC COMPUTING'S ZX CHESS 11. £45.00.
The strongest chess program with 7 levels of play.

(2) QS MOTHER BD + CONNECTOR + either SOUND or CHRS bd. **£40.00.**

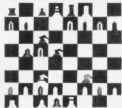
We will be at the following shows... Come and see us...

THE COMPUTER FAIR, Earls Court, 23rd to 25th April
3rd ZX MICROFAIR, Central Hall, Westminster.
30th April & 1st May

POSTAL AND MONEY ORDERS TO:

QUICKSILVA: 95, UPPER BROWNHILL RD. : MAYBUSH: SOTON: HANTS: ENGLAND.
Please state Type of machine, Which ROM, Memory size, when ordering.

ALL PRODUCTS FULLY GUARANTEED.



REVERSI

BY JOHN BALL

STAYING SHARP . . .

Making your computer play well can — as a bonus — make you think more clearly too.

Somehow, you need to give it a sense of judgement as good as your own, to make it play a nerve-wracking tussle against you. Ideally a program should be able to beat you as often as you beat it. But as a human, you improve with practice, whereas the computer cannot, unless you update it with improved logic. You can do this if you have written it yourself.

That is what I have been doing in great depth on a Sharp MZ-80K, to provide me with a reasonable opponent. As a top British player, available programs were no good to me. Ideally I wanted one up to my standard — and repeated updates improved my game too!

This article is intended to help both you and your computer play Reversi — also known as Othello — more skillfully, by three simple rules-of-thumb. They form the backbone of my program, and have been balanced by practice trial-and-error.

Thumb 1: The whole game is about capturing corners, as then you can safely expand from the captured corners without risk of capture yourself. So a general rule is take a corner whenever you can, and avoid playing next to the corners for fear of giving your opponent a chance to take it. Generally, the nearer you play to a corner the more dangerous it is in the long-term. So set values as in diagram one, making the machine select the most negative valid move.

Thumb 2: You want to force your opponent to give you one or more corners as early in the game as possible. So you want to force him by giving him no option. The best way to reduce your opponent's options is by taking as few pieces as possible

The Reversi column has been taken over by John Ball this month. John is a co-author of the book, *The Key to Othello* and a regular U.K. Othello finalist. He has also written a Reversi program for the Sharp MZ-80K, available from Sharpsoft. We will continue to look at computerising Reversi every three months.

8	-9	29	5	4	4	5	29	-9
7	29	22	3	2	2	3	22	29
6	5	3	1	1	1	1	3	5
5	4	2	1	○	●	1	2	4
4	4	2	1	●	○	1	2	4
3	5	3	1	1	1	1	3	5
2	29	22	3	2	2	3	22	29
1	-9	29	5	4	4	5	29	-9
	a	b	c	d	e	f	g	h

Fig. 1

8					●	●	C	B
7					○	●	A	D
6				○	○	○	○	○
5				○	○	○	○	●
4				○	○	○	○	●
3					○			P
2					○			
1								
	a	b	c	d	e	f	g	h

Fig. 2

8			○	○	○	○	○	
7			○	○	○	○	○	
6			○	○	○	○	○	
5			○	○	○	○	○	
4			○	○	○	○	○	
3			○	○	○	○	○	
2			○	○	○	○	○	
1			○	○	○	○	○	
	a	b	c	d	e	f	g	h

Fig. 3

— but don't lose them all! With that play, you can easily slaughter any thumbless human or machine. Once you have the corners secure, you then get revenge.

In diagram two, the square that captures least pieces for Black — D at h7 — forces White to give a corner by playing at A or C — it is the best move. So any move that takes lots of pieces early on must be bad. Add points to the value of such squares to dissuade the computer playing there.

Thumb 3: Early on, if you take a side you might feel it a good way of restricting your opponent's options — which is true. But at the end, when corners fall, he who has the sides generally loses. Look at diagram three — Black to play. Black will lose all four corners — but win massively. Try it!

So avoid taking the sides by spotting when side pieces would get captured, and again make such squares less attractive.

Balancing thumbs: No single thumb should totally over-ride any other. Sometimes it is better to take lots of pieces — if it avoids giving away a corner. Capturing a side isn't all that disastrous — so in diagram two, if it is White to play then P at h3 is far more preferable to A or C in the corner. So only add a few points to the side capture value. It also takes two pieces — but is better than the alternatives of capturing only one.

It is surprising how careful balance of thumb values can encourage good effective play. My Thumb 1 corner values are deliberately big. The squares next to a corner are ugly, while the corner is a luscious -9! The diagonal value is 22 — quite a bit preferable to the 29's — in my experience if you have to give a corner away, do it diagonally. Nine times out of 10 it is best.

Of course, there are times when the thumbs are not valid — at the end you want to capture as many pieces as possible.


```

10 / RELATIVISTIC STARSHIP SIMULATOR
20 / COPYRIGHT (C) DAVID LANGFORD 1982
30 /
100 / SET UP VARIABLES
110 CLS
120 DT=0:DELTA=604800 / TIMESTEP: 1 WEEK (SECS)
130 T0=0:T=T0 / EARTHTIME & SHIPTIME (SECS)
140 V#=000 / VELOCITY (METRES/SEC)
150 A=0:G=9.80665 / ACCELERATION 1 GRAVITY (M/SEC/SEC)
160 AMAX=10 / MAXIMUM THRUST 10G
170 D0=0 / DISTANCE FROM EARTH
180 SY=31557600 / SECS/YEAR CONVERSION
190 ML=9.4605E15 / METRES/LIGHTYEAR
200 C#=2.99792508*CC#=C#*C# / VELOCITY OF LIGHT
210 TAU=1:MAS=1 / RELATIVISTIC CORRECTION FACTORS
220 VDOK=DELTA:DDOK=DELTA*DELTA*10 / MINIMUM V & D FOR RETURN
1000 / SET UP DISPLAY
1010 F$="###.####CCCC " : G$="###.#####"
1020 S$=STRING$(9,143)
1030 PRINTS$ " STARSHIP 'FANGLORD' INSTRUMENT READOUTS " : S$
1040 PRINT@128,"VELOCITY";TAB(36)"METRES/SEC";TAB(50)"TIMESTEP"
1050 PRINT"V/C (TO 16 PLACES)";TAB(49):PRINTUSINGF#+#"VR";DELTA/SY
1060 PRINT"ACCELERATION";TAB(25)"0";TAB(36);"GRAVITIES"
1070 PRINT"EARTH TIME";TAB(36);"YEARS";TAB(50)"TIME LAG"
1080 PRINT"SHIP TIME";TAB(36);"YEARS";TAB(61)"VR"
1090 PRINT
1100 PRINT"DISTANCE FROM EARTH";TAB(36);"LIGHTYEARS";TAB(61);"KM"
1110 PRINT"APPARENT DISTANCE";TAB(36);"LIGHTYEARS";TAB(61)"KM"
1120 PRINT
1130 PRINT"TAU" FACTOR"
1140 PRINT"SHIP MASS INCREASE";TAB(43);"<AS SEEN FROM EARTH>"
1150 PRINT
1160 PRINT"TO INCREASE/DECREASE/HAUT ACCELERATION, PRESS +/-0 KEYS"
2000 / DISPLAY/MODIFY FIGURES
2010 PRINT@152,USINGF#+V#;:PRINT@216,USINGG#+R#)
2020 PRINT@2344,USINGF#+T0/SY)
2030 PRINT@2408,USINGF#+T/SY;:PRINT@433,USINGF#+(T0-T)/SY)
2040 PRINT@2536,USINGF#+D0/ML;:PRINT@561,USINGF#+D0/1000)
2050 PRINT@600,USINGF#+D/ML;:PRINT@625,USINGF#+D/1000)
2060 PRINT@728,TAU" "
2070 PRINT@732,MAS" "
3000 / TEST FOR SUCCESSFUL "RETURN" APPROXIMATELY TO EARTH
3010 IF T0<10*DELTA THEN 4000
3020 IF ABS(D0)>DDOK THEN 4000 / SHIP "CLOSE" TO EARTH
3030 IF VFLAG=1 THEN 3050 / ZERO VELOCITY ACHIEVED IN LAST DT
3040 IF ABS(V#)>VDOK THEN 4000 / "LOW" VELOCITY
3050 PRINT@886,"CONGRATULATIONS! YOU CAME CLOSE TO EARTH AGAIN, WITH LOW ";
3060 PRINT"ENOUGH VELOCITY TO DOCK SAFELY. <PRESS ANY KEY TO RESTART>";
3070 IF INKEY$="" THEN 3070 ELSE 110
4000 / ACCELERATE/DECELERATE INPUT
4010 A$=INKEY$
4020 IF A$="" THEN 5020
4030 DT=DELTA / START TIME COUNT AT FIRST THRUST
4040 IF A$="+ " AND A<AMAX THEN A=A+1:GOTO 5010
4050 IF A$="- " AND A>-AMAX THEN A=A-1:GOTO 5010
4060 IF A$="0" THEN A=0
5000 / CALCULATE NEW VALUES
5010 PRINT@280,A)
5020 DV=A*G*DT / VELOCITY INCREMENT
5030 V2#=(V#+DV)<100+V#*DV/CC#> / EINSTEIN VELOCITY ADDITION
5040 TTAU=SQR(100-V2#*V2#/CC#) / TAU EQUATION
5050 T0=T0+DT
5060 T=T+(TTAU+TAU)*DT/2
5070 D0=D0+(V#+V2#)*DT/2
5080 TAU=TTAU
5090 MAS=1/TAU
5100 IF SGN(V#)<>SGN(V2#) THEN VFLAG=1 ELSE VFLAG=0
5110 V#=V2#
5120 D=D0*TAU
5130 R#=(V#*C#)
5140 GOTO 2010

```




EINSTEIN - A-GO-GO

If you want a realistic space game, why not write Einstein's theory of relativity into your program?

In science fiction there are as many ways of commuting to the stars as there are authors. The first method is to let your spaceships travel as fast as you like — as in E.E. Smith's cosmically ridiculous space operas.

Unfortunately it seems that faster-than-light travel is forbidden by cosmic law, even more so than cheap Tube fares. The second method is to take a short cut through something called hyperspace — as in almost any Isaac Asimov book. This is simply FTL travel in a clever plastic disguise, and it falls victim to the same problems. The third method is to grit your teeth and accept that old tyrant Einstein's speed limit.

The velocity of light, is the highest speed possible in our universe — about 300,000 kilometres per second. To travel across the galaxy at this speed would seemingly take 10,000 years or so, causing spacemen great technical problems at journey's end — such as being dead.

But relativity has its advantages. On a relativistic ship — one that travels close to the speed of light — mass, length and time are strangely distorted. We can't accelerate all the way to c because at that

point the ship's mass reaches infinity. It becomes infinitely hard to push.

Also, as c approaches, the ship's clocks run slower than those at home. This features in hordes of "realistic" SF novels like Robert Heinlein's *Time for the Stars*, where the hero has his personal clock slowed by relativistic travel and returns to find himself barely older than his great-grandniece.

Tau Zero by Paul Anderson is another famous example. Time aboard Anderson's starship eventually flows so slowly that the ship outlives the universe itself. The *tau* of the title is the correction factor for mass, length and time: if v is the velocity of the ship, τ is

$$\sqrt{1 - v^2/c^2}$$

At low speeds τ is almost equal to 1, which is why your watch doesn't get noticeably slower each time you drive down the motorway. As v approaches c , though, τ shrinks towards zero but can never get there.

Our relativistic starship's mass is its stationary mass divided by τ — it seems to get heavier from the Earth viewpoint. Its length is multiplied by τ — it seems to shrink. And its clocks run τ times slower than Earth's.

We need one more equation before writing relativity

into a starship program — Einstein's equation for adding velocities.

Normally, if you're travelling at velocity v and accelerate to add an extra bit — call it u — to your speed, you expect the resulting speed to be $u + v$. This works fine at speeds much less than c ... but the correct, answer is.

$$u + v \\ 1 + uv/c^2$$

Here's a crude TRS-80 program using these equations and some very lumpy approximation — see lines 5020-70 — to track an imaginary starship. You can give the good ship *Fanglord* various accelerations towards or away from Earth, from a normal one gravity (1G) to a crushing 10G.

The display shows your velocity (in km/sec and as a fraction of c), acceleration, Earth and ship time (and the difference between these), real and apparent (shrunk by τ) distances from Earth, and τ itself.

The ship's mass increase factor is shown too. When your velocity is almost c and the mass is hundreds or thousands of times greater, all the energy of this mass ($E = mc^2$) would have had to be supplied by burning fuel. And the Hiroshima explosion's energy represented less than one gram of mass!

This is mainly a demonstra-

tion of "relativistic computing" from which you can steal bits for your own space programs. But there are challenges to try.

How quickly can you make the round trip to Proxima Centauri — 4.3 light years away — and back? Can you use the time-slowness to lose a year, say, arriving home in minimum time with that TIME LAG readout showing approximately one year?

Can you return to Earth without either overshooting hopelessly or reaching retirement age?

The "target" distance and velocity for return are set in line 220 and can easily be increased.

As well as blowing people's minds, relativistic calculations can boggle home computers. Even using double-precision for v and c , the program goes ga-ga if you accelerate indefinitely — when the machine can no longer make v any closer to c , acceleration effectively halts. "Captain," says Spock, "some unknown forces has disabled the warp drive..."

Footnote to program: The left-bracket signs in line 1010 should of course be up-arrows (↑). Reducing DELT in line 120 makes the program slower.

BY DAVID LANGFORD

DRAW YOUR OWN CONCLUSIONS

TIPS ON QIX

The arcade industry is already convinced that Qix is going to be a big draw.

Most arcade players are still making their minds up about the game which has no theme but the industry feels Qix is pointing the way to the video games future.

Tactically the game is still an enigma as players develop their own styles and even set their own game targets — like drawing pictures or putting their own initials on the screen.

We have decided to give tips to gain a really big score on one screen.

Space capture is the name of the game as your drawing head ventures off the relative safety of



the existing lines and into the realm of the Qix, a large spark which must be avoided. Additional problems are the Spax which travel along the border of the screen and up the lines you have drawn and the Fuse which chases you along an unfinished line if you hesitate in space.

Double score is awarded for drawing in "slow mode" which fills the boxed area in with a red rather than blue colour. Observant Qix players will already have noticed that you can score 1,000 bonuses for every percent of the screen filled in, over the 75% you need to earn a new screen.

The third way to score highly is to split the Qix into two. This is done on the third screen when two Qix whirl around.

The way to achieve all these ideals is to start the game by drawing thin blue boxes off the bottom of the screen. Two of these set a few inches apart can be added to by a third thin blue box which runs from the top of one vertical and falls just short of

the other. This is your first trap and you hope that the Qix will be tempted inside it, leaving you with the simple task of switching to slow mode and running across the gap to fill the rest of the screen in red. Make sure you do go right across as the Qix can escape through any gap.

Usually the Qix will remain out of reach and as the Spax continue their hectic dash around your lines you will be forced to keep on the move.

Keep adding to a network of thin blue boxes and give yourself more traps to tempt the Qix into. Long vertical chambers provide optimistic — but high-scoring chance of success.

Always keep an eye on the timer — which will release faster Spax to chase you — and the percentage of screen filled — you don't want to go over 75% until you are ready.

You won't get a long time on Qix but you will get a challenge... 99% has been done!

ARCADE FUN

Humour is a very personal thing and in every batch of cartoons sent to a magazine there are a few which will appeal to someone.

Ian Bennett sent in an arcade series of cartoons which appealed to us and we will be presenting our favourites on these pages over the next few issues.



RECORD BREAKERS

How do you rate in the arcade world. On the right we tell how four students set a new Asteroids world record, but how close are you on your favourite machine to being a world beater?

Here are some of the highest scores we have come across on some of the most popular machines around. If you can better them, or have a top score on some other machine (what about Donkey Kong?) we would like to hear from you.

Scramble

626,130

Michael Holdron

Gorf

228,570

John Lee

Phoenix

252,910

Richard Ruddick

Battlezone

157,000

Joseph Andrews

Moon Cresta

126,950

Andrew Davies

Packman

281,260

Stephen Mainwaring

Galaxians

431,820

Stewart Mathers

Missile Command

2,480,000

Kyle White

KENT QUARTET TOP 100 MILLION

Four students from Kent University have blasted their way into the arcade game record books by topping the 100 million mark on Asteroids.

David Birkett, David Hill, Tony Thomas and Alan Tilling took on their university's Asteroids machine in shifts to achieve the score.

It took them eight days after starting at 4pm on a Friday and playing through to 7am on Sunday, over a week later.

The record attempt took place during the university's Ragweek and made around £250 for Spina Brides sufferers.





ALPINE SKI

IT'S NOT ALL DOWNHILL ON THE SLOPES

St Moritz is only as far away as your local arcade with the new game of Alpine Ski.

The game offers three winter Olympic disciplines, downhill slalom and ski-jump.

The first frame is the downhill with obstacles to be dodged. These include, trees, other skiers and even a snowplough. To help you avoid these hazards, there is a good left-right control and an accelerate or push button which simulates the skier pushing off.

It needs careful timing to judge a swerve around a tree. Other features of the course include, iced up lakes which score a bonus but shoot you across fast, and increase your speed.

DRIBBLING

The second frame features the slalom with gates made up of flags for the skier to pass between. Each hit flag knocks 100 points off your score, while 50 to 300 points are notched up for each one successfully negotiated.

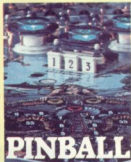
Finally the skier is faced with a ski-jump. Judge your take-off carefully as plenty of points will be scored for a long jump.

And a good score here could make sure of a bonus time. The skier must wait until he has enough speed before taking off.

The basic game lasts 1½ to 2½ minutes, depending on the operator, but bonus time is awarded for a high score of either 5, 10 or 15,000 points and for each 10-15,000 points after that.

But as the course gets more difficult, time bonuses are more difficult to win.

Fast reactions are needed to dodge obstacles and align the skier with the next slalom gate and the game rewards the player who can think and look beyond the immediate target to prepare himself for the following one.



Pinballs are already talkies, now they have taken the plunge into the film world.

The latest offering on the pinball scene, features slide shows which are won by the player if he hits targets in the correct sequence.

The film machines come in two varieties. The Sexy Girl series features nine different slide shows of girls stripping off. The film is projected onto a 9" square screen in the centre of the playfield. There are 36 different slides and according to Keith Frankham of distributors Rega, only accomplished players will see all 36.

"The girl finishes up in a 'page 3' pose," said Frankham.

The Magic Picture Pin series is a different playfield and features films of more general themes, like: space pictures, boats and animals. There are seven in this series.

"These games have only just been released in this country," said Frankham, "So it is too early to say how they are going but they have proved very successful in Germany and are played for a much longer period than other pinball machines."

THAT OLD WORLD CUP FEVER

The arcades are going to cash-in on the World Cup fever this summer with a new table-top soccer game.

The thirst for soccer will be sated by Dribbler—an electronic version of the old Bar Football craze.

The new football game has several advantages over its predecessor, for example, it allows the players to choose their team colours from six different strips.

This game originated in football-crazy Italy and on a perfect green pitch, which would even send Q.P.R. fans into raptures, two teams of seven-a-side battle it out over 90 minutes—compressed into two minutes for excitement's sake.

Two levers, on each side of the table, take the place of the four handles which used to act as controls on the manual version.

The left-hand-side lever controls three forwards and the right-hand-side three defenders and a goalkeeper.

The players can be moved back-and-forth across the pitch but they can also dribble the ball

forwards. A fire button enables the player in possession to shoot or pass and if he hangs onto the ball too long (over three seconds) this will happen automatically.

The defending player can move his men into tackling positions and hope to deflect the ball away or send his keeper diving across the goalmouth to push a shot away.

Throw-ins are avoided but it is possible to win a corner. These are thumped across the goalmouth by the machine itself with both defenders and attackers hoping to make decisive contact.

The referee's whistle keeps the game flowing and the time left and present score is displayed on both sides of the machine.

Scando Games, which is distributing the game over here, is planning to organise leagues and other championships through the pubs and arcade sites.

Ian Jamieson of Scando claims that Dribbling championships have already proved successful in Italy with World Cup tickets being put up for prizes. And one final plus: the crowd in the Dribbling stadium never cause any trouble!





OXFORD STREET
£300



PICCADILLY
£280



FLEET STREET
£220

COMMUNITY
CHEST



VINE STREET
£200



BOW STREET
£180



Ever fancied being a property speculator and making millions? Well, with the help of your Sharp you can get a taste of real life wheeler-dealing in this adaptation of the famous board game Monopoly.

From two-to-five people can play the game and £6,000 is divided equally among the players. The winner is the one who survives bankruptcy for longest or accumulates a nest egg of £5,000 in his bank account.

Moves are determined by a random selection of numbers from 1-to-5 which are printed up on the screen and the player must try to stop the small arrow which loops above these over the number of his choice. This is an interesting idea which allows some skill into the final result as there is usually at least one number you can avoid if you are sufficiently dexterous.

mino

The aim is to buy property for twice its rental value and then increase the rent by pouring in more money on subsequent landings.

Just like the board game rents have to be paid to opposing players if you land on their property.

A current bank balance is displayed at the top of the screen at the start of each player's turn — so you know just how much cash you have left to splash out on desirable residences.

If you get into financial difficulties you may sell property for one and a half times its original value by pressing the (S) key. But if you have no property to sell you face bankruptcy.

The author says the idea for the game came about as he found other computer games became boring once the player had mastered them. He claims Minoplay is a game which requires a reasonable blend of skill and luck and presents different challenges each time it is played. He adds that once the game gets down to a battle of wits between two players it can take some time to reach a conclusion.

Here are the uses of the main variables/arrays in the program.

- AS(N) Name of player
- A(N) Player's bank balance
- Z(N) Player's "Symbol"
- NO Number of players at start
- NU Number of players left as the game progresses
- Y Defines which player (e.g. his turn to go)
- PO(Y) Position of a player "Y"
- P(Y) Number of moves that player has made (0 to 24)
- R() Rent or Debt to be collected etc.

AS YOU PASS
WE'LL GATHER
YOUR

BANGOR, Co. DOWN
N. IRELAND.



Two dice are shown. The top die shows 1, 2, and 3. The bottom die shows 2, 3, and 8. The sum is 23.

CHANGE

JUST

ZX81 USERS

From "BYG BYTE" comes a fully compatible, assembled, tested and guaranteed

16k RAM PACK

PLUG-IN MEMORY

Send to Name

Address

.....

.....

All cheques and postal orders made payable to

CAPS LTD

Dept. B

And forward to 28 The Spain
Petersfield, Hampshire GU32 3LA

Allow 28 days for delivery

WHY PAY MORE?

Fully inclusive price each

£34.95

GO
As you pass
collect your salary

Two dice are shown. The top die shows 1, 2, and 3 dots. The bottom die shows 1, 2, and 3 dots.

COMMUNITY CHEST

KINGS CROSS
STATION

ANGEL
SLINGTON
\$100

CHANGE

EUSTON ROAD
£126

OXFORD STREET
£300

£200

PICCADILLY
£280VINE STREET
£200

CHANCE

BOW STREET
£180

```

3220 FOR N=8T05
3230 FOR M=8T03
3240 POKE53611:MM+MM+150:27
3250 NEXTM:N
3499 REM * ENTER/UPDATE RENTS ETC. *
3500 PRINT"*****START*****FREE"
3510 S$=""
3520 PRINT"*****":S$;R(1)
3530 PRINT"*****":S$;S$;R(2)
3540 PRINT"*****":S$;S$;S$;R(3)
3550 PRINT"*****":S$;S$;S$;S$;R(5)
3560 PRINT"*****":R(6)
3570 PRINT"*****":S$;R(7)
3580 PRINT"*****":S$;S$;"?????"
3590 PRINT"*****":S$;S$;S$;R(9)
3600 PRINT"*****":S$;S$;S$;S$;R(10)
3610 PRINT"*****":S$;S$;S$;S$;S$;R(11)
3620 PRINT"*****":R(12)
3630 PRINT"*****":S$;"FREE"
3640 PRINT"*****":S$;S$;R(14)
3650 PRINT"*****":S$;S$;S$;R(15)
3660 PRINT"*****":S$;S$;S$;S$;"?????"
3670 PRINT"*****":S$;S$;S$;S$;S$;R(17)
3680 PRINT"*****":R(18)
3690 PRINT"*****":S$;"?????"
3700 PRINT"*****":S$;S$;R(20)
3710 PRINT"*****":S$;S$;S$;R(21)
3720 PRINT"*****":S$;S$;S$;S$;"FREE"
3730 PRINT"*****":S$;S$;S$;S$;S$;R(23)
3800 GOTO 200
4000 REM * MOVE PLAYERS *
4010 POKE PO(V)+4:0
4020 P(V)=P(V)+1:IF P(V)>23 THEN P(V)=P(V)-24:A(V)=A(V)+200
4030 IF P(V)<6 THEN PO(V)=53651+P(V)+6
4040 IF P(V)>53 THEN PO(V)=53611+6+(P(V)-5)
4050 IF P(V)>11+(P(V)-18) THEN PO(V)=53971+6+(P(V)-12)
4060 IF P(V)>17 THEN PO(V)=54131+6+(P(V)-18)
4070 POKE PO(V)+2:0
5000 REM * SEE RESULT OF MOVE *
5010 U=PO(V)+42
5020 IF P(V)=0+(P(V)=4)+(P(V)=13)+(P(V)=22) THEN 200
5030 IF P(V)=0+(P(V)=16)+(P(V)=19) THEN 700
5040 IF P(V)=3+(PEEK(U)=Z(V)) THEN 200
5050 GOSUB 3000
5060 PRINT"O.K. "1$;V(1)"; YOU HAVE LANDED ON"
5065 IF PEEK(U)=67 THEN 5200
5070 IF PEEK(U)=2(V) THEN 5300
5075 IF PEEK(U)=202 THEN W=0
5080 IF PEEK(U)=199 THEN W=1
5085 IF PEEK(U)=68 THEN W=2
5090 IF PEEK(U)=99 THEN W=3
5095 IF PEEK(U)=107 THEN W=4
5100 PRINT$;U(1);"S PROPERTY."
5110 IF P(V)=0+(P(V)=13)+(P(V)=22) THEN 200
5120 PRINT"PAY OUT THE £"1$;R(P(V));" DUE !!!"
5130 FOR T=0 TO 2500:NEXT
5140 A(V)=A(V)-R(P(V)):R=0
5150 IF A(V)<0 THEN 5500
5170 A(V)=A(V)+R(P(V))
5180 GOTO 3500
5200 PRINT"FOR SALE" PROPERTY"
5210 IF P(V)=2+(P(V)=13)+(P(V)=19) THEN 5400
5220 PRINT"YOU HAVE £"1$;R(P(V));" IN THE BANK."
5230 PRINT"DO YOU WISH TO BUY FOR £"1$;R(P(V));" *2 *" (V-10)
5240 K$=""1$;GET K$;IF K$="" THEN 5240
5250 IF K$="Y" THEN A(V)=A(V)-R(P(V))+2:1$;POKE U:2(V)
5260 GOTO 3500
5300 PRINT"YOUR OWN PROPERTY"

```



SITING

Superior Systems Ltd. Sheffield

178 West Street, S14 4ET. Tel. (0742) 755005.



VIC 20

HARDWARE

VIC 20 computer (3.5")	£199.95
VIC 2N cassette unit	£44.95
VIC printer	£230.00
Single floppy unit	£396.00
Memory expansion unit	£125.95
VIC RS232 interface	£34.95
IEEE-488 interface	£34.50
VIC 3k RAM cartridge	£29.95
VIC 16k RAM cartridge	£44.95
VIC 16k RAM cartridge	£74.95
VIC programmer aid	£34.95
Super expander high res	£34.95
Machine code pack	£7.50
VIC joystick	£13.50
VIC paddles	£13.50

SOFTWARE

Intro to Basic pt. 1	£14.95
Average ROM	£19.95
Star Battle ROM	£19.95
Super Star ROM	£19.95
Jelly Monsters	£19.95
Alien ROM	£19.95
Super Lander	£19.95
Road Race	£19.95

VIC BOOKS

Computer programming	£1.95
The VIC Revealed	£10.00
The VIC Programming Guide	£10.00

ACORN



8K ROM-5K RAM, with P.S.U., colour encoder and introduction pack £199.00

SOFTWARE

GAMES PACK

1. Asteroids, Sub Hunt, Breakout	£11.50
2. Dought, Mastermind, Zombis	£11.50
3. Rat Trap, Simultaneous, Regression	£11.50
4. Star Trek, Four Row, Space Attack	£11.50
5. Invaders, Wumpus, Reversi	£11.50
6. Dodgins, Simon, Amnesia	£11.50
7. Green Things, Ballistics, Snake	£11.50
8. Star Gate, Go-Moku, Robots	£11.50
9. Snapper, Minotaur, Babes	£11.50
10. Ten games for the Basic Atom	£11.50
Atom Chess	£11.50
Atom Adventure	£11.50
Atom Life	£11.50
Superior systems games pack 1, Disassembler, Crunch, Tank Battle	£8.00

EDUCATIONAL

Maths pack 1	£11.50
Maths pack 2	£11.50
Atom word tutor	£11.50

UTILITIES

Peeko computer	£11.50
Utility pack 1	£11.50
Soft VDU	£11.50
Atom synthesiser	£11.50
Atom Forth Language (ex. manual)	£11.50
Forth forth and practice	£8.00

BUSINESS

Word pack ROM	£29.95
Database	£100.00
Atom business pack	£11.50
Atom business book	£8.95
Desk diary	£10.00
Special four cassette introductory pack; interactive teaching, financial, household and games	£23.00

VIDEOGENIE



Genie II computer	£355.50
Genie II business computer	£355.00
Genie II, 64k RAM, single console inc. 720k formatted on line storage in twin floppy drives, detachable keyboard, supplied complete with Newdis II operating system	T.B.A.
EXPANSION	
EG 3014 including 16K RAM card and disk interface	£228.85
EG 3015/16 16K RAM card	£195.23B
EG 3015/16 32K RAM card	£148.12B
EG 400 single disk drive	£247.25B
EG 400AT dual disk drive	£421.25B
EG 3020 internal RS 232 interface for EG 3014	£43.70B
EG 3021 double density adaptor for the EG 3014	£79.35C
EG 3022 5100 bus adaptor for the EG 3014	£70.73C
LE 19 EPROM unit	£30.48B
EP1 EPROM for LE 19 with Genie I functions	£13.80B
EP2 EPROM for LE 19 with single key commands, remumber and language monitor	£13.80B

SHARP

Sharp MZ80K computer (48K)	£399.00
MZ-80 IO expansion unit	£109.25B
MZ-80 SFD single floppy unit	£454.25B
MZ-80 FB dual floppy unit	£832.50B
MZ-80 PS dot matrix printer	£1414.00B
MZ-80 P-80 disk interface card	£57.50C
MZ-80 FMD master disk and manual	£23.00C
MZ-80 KFC cable	£26.40B
MZ-80 B/M Basic manual	£8.50B
MZ-80 TIC6 Basic language cassette	£16.83B
MZ-80 T20C machine language package	£20.48B
MZ-80 TU editor assembler package	£40.25B
MZ-80 IO universal interface card	£44.95B
MZ-80 K20AE P-80 for the MZ-80K	£75.90C
MZ-80 BT70E Basic compiler (f.dos)	£44.95B
MZ-80 BT40C Pascal interpreter	£46.50B

KUMA SOFTWARE FOR MZ-80K

Wordpro word processor (tape)	£45.43A
Wordpro word processor (disk)	£91.74B
Apollo word processor (tape)	£28.69A
Database (cassette based)	£33.93A
MZ-80 Calc II (based on Visicalc)	£39.68A

APPLE GAMES

Elementary My Dear Apple	£17.25A
Falcons	£18.75A
Gobblin	£14.48A
High Res Soccer	£24.28A
Inferno	£18.75A
Kulic	£11.62A
Snoggle	£14.38A
Adventure	£21.74A
Jobbreaker	£19.95A
Pool 1.5	£23.00A

BBC ACCESSORIES

Disk drive (100K)	£265.00B
Tallent receiver	£185.99B
4in colour monitor	£287.50B
Prestel receiver	£104.54C
Cassette recorder	£29.90C
3ft video lead UHF to BNC	£9.50A
5 pin DIN to 25 way D type	£9.50A
Cassette lead to 3 jack plug	£3.50A
Centronics printer cable	£18.40A
Serial printer cable	£18.40A
Games profile	£13.50A
User guide	£10.00B
Cassette deck	£28.75C

Postage Rates

a.75p b.1.00 c.1.50 d.2.50 e.5.00

Prices inc.VAT Send SAE for full Mail Order List

MAIL ORDER

PLEASE SUPPLY

£ _____ Name _____

£ _____ Address _____

£ _____

£ _____

Access/Barclaycard/

Cheque, Card No

P&P

Total

£ _____

Code _____ Tel _____

JUST

ZX 80/81 HARDWARE/SOFTWARE

ZX KEYBOARD

Now with repeat key and facilities to add numeric pad. The keyboard has all the 80/81 functions on the keys, and will greatly increase your programming speed. It is fitted with push type keys as in larger computers.

The keyboard has been specially designed for the Sinclair computer and is supplied ready-built. It also has facilities for 3 extra buttons which could be used for on/off switch, reset, etc. **£27.95.** Numeric add on **£10.**



4K GRAPHICS ROM

The dK Graphic module is our latest ZX81 accessory. This module, unlike most other accessories fits neatly inside your computer under the keyboard. The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you 448 extra pre-programmed graphics, your normal graphic set contains 64. This means that you now have 512 graphics and with there inverse 1024. This now turns the 81 into a very powerful computer, with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there; it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder is fitted with a 1K/2K RAM and can be used for user defineable graphics so you can create your own custom character sets. **£29.95.**

MEMORY 80/ 81

16K RAM

Massive add-on memory for 80/81. **£32.95.**

16K KIT-A-KIT VERSION

of a 16K Ram. Full instructions included. All memory expansions plug into the user port at the rear of the computer. 16K RAM **£42.95** 16K KIT **£32.95**

2K & 4K RAM

Static Ram memory expansion for the 80/81. They both work with onboard Ram i.e. 4K plus onboard = 5K. This is the cheapest small memory expansion available anywhere. 2K RAM **£14.95.** 4K RAM **£19.95.**

IO PORT

Interface your computer with the real world, our IO port has holders to add up to 6K of RAM. **£12.95.**

16K 81 SOFTWARE

As seen at the ZX Microfair.

DEFLEX This totally new and very addictive game, which was highly acclaimed at the Microfair, uses fast moving graphics to provide a challenge requiring not only quick reaction, but also clever thinking. One and two player versions on same cassette. **£3.95**
3D/3D LABYRINTH You have all seen 3D Labyrinth games, but this goes one stage beyond; you must manoeuvre within a cubic maze and contend with corridors which may go left/right/up/down. Full size 3D graphical representation. **£3.95.**

CENTPEDE. This is the first implementation of the popular arcade game on any micro anywhere. Never mind your invaders, etc., this is positively stunning, the speed at which this runs makes ZX invaders look like a game of simple snap. **£4.95.**
Graphic ROM Software Centipede. The graphic ROM version of our popular Centipede game. The only real version of Space Invaders on the ZX81.

23 Sussex Road, Gorleston,
Great Yarmouth, Norfolk.
Telephone: Yarmouth (0493) 602453

dK'tronics

GO

KINGS CROSS
STATION

ANGEL
ISLINGTON
£100



CHANCE

EUSTON ROAD
£126



JUST

VISITING

```

8030 PRINT# 66,000 is divided equally amongst "you"
8040 PRINT# "to five players, who are then asked to"
8050 PRINT# "enter their Christian Names."
8060 PRINT# "The winner is the one who either"
8070 PRINT# "survives Bankruptcy, or accumulates"
8080 PRINT# "25,000 or more in his Bank Account."
8090 PRINT# "Players take it in turn to move the"
8100 PRINT# "number of spaces determined by rolling the"
8110 PRINT# "number of the moving"
8120 PRINT# "stop at the appropriate number."
8130 PRINT# "CR << Key at the appropriate number, and"
8140 PRINT# "If you land on vacant Property, you"
8150 PRINT# "may increase it's Rental Value."
8160 PRINT# "If you land on money, you may buy it"
8170 PRINT# "for twice it's Rental Value."
8180 PRINT# "If you land on your own Property, you"
8190 PRINT# "may increase it's Rent by paying the"
8200 PRINT# "rental value of it at that time. However"
8210 PRINT# "Rents are limited to 3 times their"
8220 PRINT# "original value."
8230 PRINT# "CR << FOR MORE INFORMATION"
8240 PRINT# "PRESS V"
8250 PRINT# "GET V"
8260 PRINT# "MINOPOLY - **"
8270 PRINT# "Rents have to be paid if you land on"
8280 PRINT# "anyone else's Property"
8290 PRINT# "spaces you"
8300 PRINT# "on the (???) advantage or"
8310 PRINT# "by landing on a"
8320 PRINT# "take a penalty."
8330 PRINT# "A current Bank Balance is displayed"
8340 PRINT# "for each Player at the top of the screen"
8350 PRINT# "of each one a Player may sell"
8360 PRINT# "his turn and a half times the ($)"
8370 PRINT# "When it's his turn, by pressing the (S)"
8380 PRINT# "this Rental Value, by pressing the (S)"
8390 PRINT# "But be careful, if you have no"
8400 PRINT# "to sell, you will automatically"
8410 PRINT# "Property to sell, you will automatically"
8420 PRINT# "declared Bankrupt."
8430 PRINT# "YOU WANT A REPEAT OF THESE?"
8440 PRINT# "FOR YOU YES, N - for No."
8450 PRINT# "PRESS V - for YES, N - for No."
8460 PRINT# "GET V"
8470 PRINT# "MINOPOLY - **"
8480 PRINT# "Rents have to be paid if you land on"
8490 PRINT# "anyone else's Property"
8500 PRINT# "spaces you"
8510 PRINT# "on the (???) advantage or"
8520 PRINT# "by landing on a"
8530 PRINT# "take a penalty."
8540 PRINT# "A current Bank Balance is displayed"
8550 PRINT# "for each Player at the top of the screen"
8560 PRINT# "of each one a Player may sell"
8570 PRINT# "his turn and a half times the ($)"
8580 PRINT# "When it's his turn, by pressing the (S)"
8590 PRINT# "this Rental Value, by pressing the (S)"
8600 PRINT# "But be careful, if you have no"
8610 PRINT# "to sell, you will automatically"
8620 PRINT# "Property to sell, you will automatically"
8630 PRINT# "declared Bankrupt."
8640 PRINT# "YOU WANT A REPEAT OF THESE?"
8650 PRINT# "FOR YOU YES, N - for No."
8660 PRINT# "PRESS V - for YES, N - for No."
8670 PRINT# "GET V"
8680 PRINT# "MINOPOLY - **"
8690 PRINT# "Rents have to be paid if you land on"
8700 PRINT# "anyone else's Property"
8710 PRINT# "spaces you"
8720 PRINT# "on the (???) advantage or"
8730 PRINT# "by landing on a"
8740 PRINT# "take a penalty."
8750 PRINT# "A current Bank Balance is displayed"
8760 PRINT# "for each Player at the top of the screen"
8770 PRINT# "of each one a Player may sell"
8780 PRINT# "his turn and a half times the ($)"
8790 PRINT# "When it's his turn, by pressing the (S)"
8800 PRINT# "this Rental Value, by pressing the (S)"
8810 PRINT# "But be careful, if you have no"
8820 PRINT# "to sell, you will automatically"
8830 PRINT# "Property to sell, you will automatically"
8840 PRINT# "declared Bankrupt."
8850 PRINT# "YOU WANT A REPEAT OF THESE?"
8860 PRINT# "FOR YOU YES, N - for No."
8870 PRINT# "PRESS V - for YES, N - for No."
8880 PRINT# "GET V"
8890 PRINT# "MINOPOLY - **"
8900 PRINT# "Rents have to be paid if you land on"
8910 PRINT# "anyone else's Property"
8920 PRINT# "spaces you"
8930 PRINT# "on the (???) advantage or"
8940 PRINT# "by landing on a"
8950 PRINT# "take a penalty."
8960 PRINT# "A current Bank Balance is displayed"
8970 PRINT# "for each Player at the top of the screen"
8980 PRINT# "of each one a Player may sell"
8990 PRINT# "his turn and a half times the ($)"
9000 PRINT# "When it's his turn, by pressing the (S)"
9010 PRINT# "this Rental Value, by pressing the (S)"
9020 PRINT# "But be careful, if you have no"
9030 PRINT# "to sell, you will automatically"
9040 PRINT# "Property to sell, you will automatically"
9050 PRINT# "declared Bankrupt."
9060 PRINT# "YOU WANT A REPEAT OF THESE?"
9070 PRINT# "FOR YOU YES, N - for No."
9080 PRINT# "PRESS V - for YES, N - for No."
9090 PRINT# "GET V"
9100 PRINT# "MINOPOLY - **"
9110 PRINT# "Rents have to be paid if you land on"
9120 PRINT# "anyone else's Property"
9130 PRINT# "spaces you"
9140 PRINT# "on the (???) advantage or"
9150 PRINT# "by landing on a"
9160 PRINT# "take a penalty."
9170 PRINT# "A current Bank Balance is displayed"
9180 PRINT# "for each Player at the top of the screen"
9190 PRINT# "of each one a Player may sell"
9200 PRINT# "his turn and a half times the ($)"
9210 PRINT# "When it's his turn, by pressing the (S)"
9220 PRINT# "this Rental Value, by pressing the (S)"
9230 PRINT# "But be careful, if you have no"
9240 PRINT# "to sell, you will automatically"
9250 PRINT# "Property to sell, you will automatically"
9260 PRINT# "declared Bankrupt."
9270 PRINT# "YOU WANT A REPEAT OF THESE?"
9280 PRINT# "FOR YOU YES, N - for No."
9290 PRINT# "PRESS V - for YES, N - for No."
9300 PRINT# "GET V"
9310 PRINT# "MINOPOLY - **"
9320 PRINT# "Rents have to be paid if you land on"
9330 PRINT# "anyone else's Property"
9340 PRINT# "spaces you"
9350 PRINT# "on the (???) advantage or"
9360 PRINT# "by landing on a"
9370 PRINT# "take a penalty."
9380 PRINT# "A current Bank Balance is displayed"
9390 PRINT# "for each Player at the top of the screen"
9400 PRINT# "of each one a Player may sell"
9410 PRINT# "his turn and a half times the ($)"
9420 PRINT# "When it's his turn, by pressing the (S)"
9430 PRINT# "this Rental Value, by pressing the (S)"
9440 PRINT# "But be careful, if you have no"
9450 PRINT# "to sell, you will automatically"
9460 PRINT# "Property to sell, you will automatically"
9470 PRINT# "declared Bankrupt."
9480 PRINT# "YOU WANT A REPEAT OF THESE?"
9490 PRINT# "FOR YOU YES, N - for No."
9500 PRINT# "PRESS V - for YES, N - for No."
9510 PRINT# "GET V"
9520 PRINT# "MINOPOLY - **"
9530 PRINT# "Rents have to be paid if you land on"
9540 PRINT# "anyone else's Property"
9550 PRINT# "spaces you"
9560 PRINT# "on the (???) advantage or"
9570 PRINT# "by landing on a"
9580 PRINT# "take a penalty."
9590 PRINT# "A current Bank Balance is displayed"
9600 PRINT# "for each Player at the top of the screen"
9610 PRINT# "of each one a Player may sell"
9620 PRINT# "his turn and a half times the ($)"
9630 PRINT# "When it's his turn, by pressing the (S)"
9640 PRINT# "this Rental Value, by pressing the (S)"
9650 PRINT# "But be careful, if you have no"
9660 PRINT# "to sell, you will automatically"
9670 PRINT# "Property to sell, you will automatically"
9680 PRINT# "declared Bankrupt."
9690 PRINT# "YOU WANT A REPEAT OF THESE?"
9700 PRINT# "FOR YOU YES, N - for No."
9710 PRINT# "PRESS V - for YES, N - for No."
9720 PRINT# "GET V"
9730 PRINT# "MINOPOLY - **"
9740 PRINT# "Rents have to be paid if you land on"
9750 PRINT# "anyone else's Property"
9760 PRINT# "spaces you"
9770 PRINT# "on the (???) advantage or"
9780 PRINT# "by landing on a"
9790 PRINT# "take a penalty."
9800 PRINT# "A current Bank Balance is displayed"
9810 PRINT# "for each Player at the top of the screen"
9820 PRINT# "of each one a Player may sell"
9830 PRINT# "his turn and a half times the ($)"
9840 PRINT# "When it's his turn, by pressing the (S)"
9850 PRINT# "this Rental Value, by pressing the (S)"
9860 PRINT# "But be careful, if you have no"
9870 PRINT# "to sell, you will automatically"
9880 PRINT# "Property to sell, you will automatically"
9890 PRINT# "declared Bankrupt."
9900 PRINT# "YOU WANT A REPEAT OF THESE?"
9910 PRINT# "FOR YOU YES, N - for No."
9920 PRINT# "PRESS V - for YES, N - for No."
9930 PRINT# "GET V"
9940 PRINT# "MINOPOLY - **"
9950 PRINT# "Rents have to be paid if you land on"
9960 PRINT# "anyone else's Property"
9970 PRINT# "spaces you"
9980 PRINT# "on the (???) advantage or"
9990 PRINT# "by landing on a"

```



INSTRUCTIONS"

minopoly

RUNS ON A SHARP MZ-80K
BY FRED BUICK

MARYLEBONE
STATION



£200



WHITEHALL
£160

INCOME TAX



PAY £200



PALL MALL
£140



JUST



PUCKMAN

MUNCH your way around a maze in this adaptation of the popular arcade game. The deadly ghost which haunts this maze is just as hungry as in the arcade version — but it's not after the tasty dots which fill the maze — it's after you!

But the ghost is not invulnerable. From time to time it becomes luminous. Then you have 10 seconds to catch it — but you have to be quick as during this time the ghost also puts on an extra turn of speed.

If you catch the ghost it returns to the centre of the maze and the game continues. If the ghost is not captured in time then you lose.

Your character is controlled by the keyboard but the ghost moves randomly, changing direction when it reaches a junction in the maze.

Once the maze is emptied of dots — and you have managed to avoid the ghost — it is refilled and the game gets harder.

Every number possible has been changed to a variable to speed up the program as much as possible. Many of the GOTO's and RETURNS are also for speed.

Here are some details of the program:

Lines 50-70 control timing of the ghost. Lines 90-130, control movement of the Puckman. Lines 140-190, control ghosts' movement. Lines 210-260, scoring. Lines 280-290, tunnel joining sides of maze. Lines 310-320, random movement of ghost. Lines 380-410, variables. Lines 420-660 maze. Lines 780-1240, instructions.

BY SIMON MABLEY

RUNS ON A 40 COLUMN PET

IN 8K

```
1 REM*** PUCKMAN ***
2 REM
3 REM*** BY S.P.MABLEY ***
4 REM
5 REM*** INSTRUCTIONS BY P.SALMON ***
6 REM
7 REM*** COPYRIGHT 1/2/82 ***
8 REM
10 PRINT "WOULD YOU LIKE INSTRUCTIONS?(Y/N)"
20 GETA$:IFA$="" THEN20
30 IFA$="Y" THEN730
40 GOTO380
50 IFJ=PANDVAL(TI#)>I THENI=0:K=R:J=N:TI$="000000":Z=P1
60 IFJ=NANDVAL(TI#)>I THEN710
70 IFH>M THENM=M+1:Z=20:Q=6:GOTO420
80 A=PEEK(O)
90 IFA$=STHNB=T:POKEC,U:C=C-T:GOSUB180:POKEC,V:GOTO130
```




```
100 IFA=VTHENE=-T:POKEC,U:C=C+T:GOSUB180:POKEC,V:GOTO130
110 IFA=XTHENE=P:POKEC,U:C=C-P:GOSUB180:POKEC,V:GOTO130
120 IFA=YTHENE=-P:POKEC,U:C=C+P:GOSUB180:POKEC,V
130 FORL=PTOZ
140 IFD=PTHEHB=T:POKEE,F:E=E-T:GOSUB280:POKEE,K:NEXTL:GOTO50
150 IFD=P1THEHB=-T:POKEE,F:E=E+T:GOSUB280:POKEE,K:NEXTL:GOTO50
160 IFD=B1THEHB=P:POKEE,F:E=E-P:GOSUB280:POKEE,K:NEXTL:GOTO50
170 B=-P:POKEE,F:E=E+P:GOSUB280:POKEE,K:NEXTL:GOTO50
180 IFC=C1THEHC=D1:GOTO200
190 IFC=E1THEHC=F1
200 G=PEEK(C)
210 IFG=G1THEHC=C+B:RETURN
220 IFG=H1THEHC=H+J1:RETURN
230 IFG=I1THEHC=H+K1:RETURN
240 IFG=L1THEHC=H+M1:RETURN
250 IFG=H1THEB80
260 IFG=RTHEHTI#="000000":K=N1:I=ZZ:J=P:Z=P:E=33188:F=PEEK(33188):RETURN
270 RETURN
280 IFE=E1THEHC=F1:GOTO300
290 IFE=C1THEHC=D1
300 N=PEEK(E)
310 IFD=P1ORD=PTHENIFPEEK(E+P)<G10RPEEK(E-P)<G1THEHC=INT(RND(TI)*Q1)+P
320 IFD=G1ORD=B1THENIFPEEK(E+T)<G10RPEEK(E-T)<G1THEHC=INT(RND(TI)*Q1)+P
330 IFN=G1THEHC=E+B:D=INT(RND(TI)*Q1)+P:RETURN
340 IFN=VANDK=RTHEHTI#="000000":K=N1:I=ZZ:J=P:Z=P:E=33188:F=PEEK(33188):RETURN
350 IFN=VTHEB80
360 F=N
370 RETURN
380 PRINT"J":N=0:D=151:P=1:Q=10:R=163:S=50:T=40:U=32:V=193:W=18:X=42:Y=41:Z=1
390 C1=33247:D1=33287:E1=33288:F1=33248:G1=102:H1=46:I1=81:J1=10:K1=100:L1=90
400 M1=500:N1=35:P1=2:Q1=4:E=33188:C=33348:K=35:TI#="000000":M=16250:I=45:Z=1
410 J=1:D=1:F=46:ZZ=30:H=0
420 PRINT"§ .....§"
430 PRINT"§ .....§"
440 PRINT"§ .....§"
450 PRINT"§ .....§"
460 PRINT"§ .....§"
470 PRINT"§ .....§"
480 PRINT"§ .....§"
490 PRINT"§ .....§"
500 PRINT"§ .....§"
510 PRINT"§ .....§"
520 PRINT"§ .....§"
530 PRINT"§ .....§"
540 PRINT"§ .....§"
550 PRINT"§ .....§"
560 PRINT"§ .....§"
570 PRINT"§ .....§"
580 PRINT"§ .....§"
590 PRINT"§ .....§"
600 PRINT"§ .....§"
610 PRINT"§ .....§"
620 PRINT"§ .....§"
630 PRINT"§ .....§"
640 PRINT"§ .....§"
650 PRINT"§ .....§"
660 PRINT"§ .....§"
```

Illustration: Dorcas Cross

ADVENTURE GAMES

Mission of the Deep. Fight your way through giant crabs, eels & explosive cargo to get the radioactive device. 16K £5.95.

Nightmare Park. The keeper challenges you to match your wits against unknown odds. No human has succeeded! 14K £4.95.

Warrior. Find and rescue your princess and battle with monsters, 3 dimensional display. 16K £4.95.

SPACE GAMES

Space Invaders. Fast interactive graphics, on screen scoring, destructible protective shields. 1K £4.95. Super 3K £5.95.

Space Rescue. Save your crew from the planet surface, avoiding the moving stars. 16K £3.95.

Planetoids. Skillfully plot your craft through the Asteroid Belt before your energy runs out. 16K £3.95.

16K RAM Pack

assembled, tested and cased
£37.50 inc (P&P) Allow 21 days delivery

All supplied on cassette with instructions
send cheque, P.O. or Card no. with order



26 Spiers Close, Knowle, Solihull
West Midlands, B93 9ES, England

MACRONICS



Computers for All

We're only a few minutes from your Post Box.

So why not try our mail order service.

MAIN DEALERS FOR
ACORN - VIC 20
B.B.C. - ATARI
for further information
send large S.A.E.

STOP PRESS

NOW IN STOCK

BBC

MICROCOMPUTER

RAM upgrade

16K of RAM

as used in BBC

microcomputers

ONLY £55.20

plus £1 p.p.

Computers for All

72 NORTH STREET,
ROMFORD, ESSEX.
TEL 0708 752862



COMPUTER SYSTEMS FOR THE HOME & BUSINESS ENTHUSIAST



Sharp
MZ80K
48K RAM
£399
2 year
guarantee

Twin Disk Unit £520
Column Printer £399
Single Disk Unit £412
FURTHER ACCESSORIES AVAILABLE



Sharp
MZ80B
64K RAM
£1064
Fully
Guaranteed

Twin Disk Unit £620
Column Printer £356
Single Disk Unit £412
Graphic RAM II.....CPM.....RS232
Basic compiler.....Pascal.....Double
Precision Basic.....FDOS.....IEEE Interface
.....132 Col Printer..... & many more
accessories available

Sharp 3201
Business Computer £1449
Monitor £240
Printer £434
Twin Disk Unit £549
Interface £118

SPECIAL OFFER ON COMPLETE SYSTEM E2772

Sharp PC1211 Pocket Computer
£93
• Programs in basic • Querty
Alphabetical Keyboard • 1.9 K RAM •

(Long Battery Life with Interface E105)
Printer for the above £67

VIC 20
£199

Disk Drive,
Printer & Cassette
Deck Available P.O.A.

Atari 2600 plus Combat £95.45
Philips G7000 Computer
Game of the Future only £84
Mattel Intellivision the most advanced
computer game an unbelievable £189

* Credit facilities available
* Mail order - make cheques P. Order
payable to Video Services P. Order.
PHONE FOR FURTHER DETAILS

The Amazing Atari Personal Computers



Atari 400
16K RAM from only £299
Expandable to 32K - amazing
graphics & sound effects. The game
computer of the future must be seen
to be believed. Programs in "Basic"
"Assembler" "Pilot"

Atari 800
16K RAM £599
(Accessories for the Atari 400/800)
Single Disk Drive £435
16K RAM £350
Atari 410 Recorder £65
Joysticks £12.50
Printer Phone For Details

SPECIAL DISCOUNTS ON COMPLETE SYSTEMS

SOFTWARE
Philips (G7000) from £12.99
Mattel Intellivision £16.75
VIC 20 from £14.95
Sharp Software from £6.32
Atari 400/800 from £9.95 (offering Arcade
& adventure games & education
& Business Applications)
Atari 2600 from £15.50

VIDEO SERVICES (BROMLEY)
8 SUNDRIDGE PARADE
PARISTOW LANE BROMLEY KENT
(near Sundridge Park Station)

Prices include VAT
& may change during month

THE BROMLEY COMPUTER CENTRE

TELEPHONE 01-460 4169/8833


```

670 POKEC,V:GOTO80
680 PRINT"#####SCROMPED BY THE PHANTOM OF THE MAZE!"
690 PRINT"#####YOU SCORED "H;" POINTS"
700 GOTO730
710 PRINT"#####TIME RAN OUT ON YOU I'M AFRAID BUT YOU "
720 PRINT"#####DID MANAGE TO SCORE "H;" POINTS"
730 IFH>TSTHENTS=H
740 PRINT"#####THE TOP SCORE IS"TS
750 PRINT"#####PRESS <SPACE> TO TRY ANEW!"
760 GETLL#1:IFLL#<>" THEN760
770 GOTO380
780 PRINT"#####:PRINTTAB(13);"INSTRUCTIONS"
790 PRINT"#####THIS IS THE GAME OF PUCKMAN"
800 PRINT"#####BASED ON THE NOBLE GAME SEEN IN MANY
810 PRINT"#####THE IDEA IS TO 'MUNCH' AS MANY DOTS, DRINKING ESTABLISHMENTS"
LE" BLOBS AND DIAMONDS AS POSSI
820 PRINT"#####HOWEVER YOU MUST BEWARE THE 'PHANTOM' WHO HAUNTS THE MAZE"
830 PRINT"#####SCORING"
840 PRINT"#####"
850 PRINT"#####THE DOTS SCORE 10 POINTS"
860 PRINT"##### BLOBS 100
870 PRINT"##### DIAMONDS 500
880 PRINT"#####PRESS <SPACE> TO CONT"
890 GETA#1:IFA#<>" THEN890
900 PRINT"#####"
910 PRINT"#####HOWEVER"
920 PRINT"#####"
930 PRINT"#####EVERY 30 SECONDS"
940 PRINT"#####THE 'PHANTOM' HAS AN ANNOYING HABIT OF TURNING LUMINOUS"
950 PRINT"#####WHEN IT DOES THIS YOU MUST CHASE AFTER HIM AND LAND ON HIM"
960 PRINT"#####IF YOU CAN DO THIS YOU HAVE ANOTHER 30 SECONDS TO 'MUNCH' SOME MORE
";
970 PRINT" DOTS ETC."
980 PRINT"#####HOWEVER HE IS ONLY LUMINOUS FOR A SPACE OF 10 SECONDS-SO BE QUICK!!
990 PRINT"#####PRESS <SPACE> FOR MORE."
1000 GETA#1:IFA#<>" THEN1000
1010 PRINT"#####"
1020 PRINT"#####MOVING"
1030 PRINT"#####"
1040 PRINT"#####YOU ARE REPRESENTED BY REVERSE SPADE "
1050 PRINT"#####THE 'PHANTOM' IS SHOWN AS A HASH "#"
1060 PRINT"#####THE KEYS FOR MOVEMENT ARE:-
1070 PRINT"#####UP
1080 PRINT"#####DOWN
1090 PRINT"#####RIGHT
1100 PRINT"#####LEFT-4 +
1110 PRINT"##### PRESS <SPACE> TO CONT.
1120 GETA#1:IFA#<>" THEN1120
1130 PRINT"#####"
1140 PRINT"#####READY TO PLAY?"
1150 PRINT"#####"
1160 PRINT"#####NOW YOU ARE READY TO PLAY PUCKMAN "
1170 PRINT"#####YOUR SCORE WILL BE GIVEN TO YOU AT THE END OF THE GAME."
1180 PRINT"#####A GOOD SCORE (TO BE PROUD OF) IS 15000"
1190 PRINT"#####AND FINALLY IF YOU CLEAR THE MAZE IT WILL REFILL BUT YOU HAVE";
1200 PRINT" LESS TIME TO MOVE"
1210 PRINT"#####WATCH OUT FOR THE PHANTOM!!"
1220 PRINT"##### PRESS <SPACE> TO BEGIN.
1230 GETA#1:IFA#<>" THEN1230
1240 GOTO380

```


THE VIC NEEDS VIC REVEALED

**THE DEFINITIVE REFERENCE
BOOK ON THE VIC SYSTEM
FROM NICK HAMPSHIRE**

Now available. Price £10.00 from Commodore dealers and bookshops. Nick Hampshire Publications, P.O. Box 13, Lysander Road, Yeovil, Somerset.



DOUBLE Cannon is a shoot-em-up (or down) game for one or two players. A sharp eye is needed to judge when the randomly moving target crosses the path of your laser cannon.

But you can't waste time waiting for the perfect shot, as the game is also timed. Yet, it is important that you not waste any shots, either, since your cannon has just enough energy for 20 shots.

To fire, the player on the left need only press the Z key, while the player on the right should press the M key. A green box will indicate the time remaining in the game and a blue box for each cannon will show the number of shots you have used. Hits are recorded by red blocks above each cannon's blue box. For two players, the winner is the shooter with the most hits. When there is just one player, the object is to get as many hits as possible.

Included with the line listing are definitions of the major variables. Also, a line-by-line description of the main game loop is presented.

Perhaps of interest to programmers is the movement of the target. The target location for the PLOT commands is X, Y. This is adjusted each move by the variable X1 and Y1 (line numbers 302, 307). For example; if X=30, Y=10, X1=1 and Y1=1, then after line number 307 has been executed, X=31 and Y=11 — so the target is moving down and to the right.

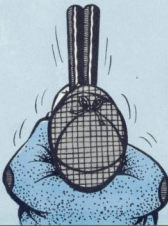
When the target reaches the right edge of the screen, X1 will be changed to -X1 (X1=-1), since in line 302 the test for X greater than 57 is true. Now the value will decrease by one as Y increases — so the target will move down and to the left.

DOUBLE CANNON

BY DAVID BOLKHE

```
5 REM DAVE BOHLKE COBSON, IA
6 REM DOUBLE CANNONS
10 GRAPHICS 5:SETCOLOR 0,6,7
20 SETCOLOR 2,4,7:SETCOLOR 4,15,8
100 COLOR 1:PLOT 8,31:DRAWTO 0,39
102 PLOT 9,32:DRAWTO 2,39
104 PLOT 71,31:DRAWTO 79,39
106 PLOT 70,32:DRAWTO 77,39
110 X1=1:Y1=1
112 X=INT(RND(1)*25)+25
114 Y=INT(RND(1)*15)+3
119 PRINT
120 PRINT " LEFT press Z , and RIG
HT M "
122 PRINT "Each side has 20 shots, sho
wn in BLUE"
124 PRINT "HITS are displayed in RED.
"
126 PRINT "Time left is indicated in 6
REEN. "
150 PLOT 9,39:DRAWTO 31,39
152 PLOT 9,37:DRAWTO 31,37
154 PLOT 9,38:PLOT 31,38
160 PLOT 69,39:DRAWTO 47,39
162 PLOT 69,37:DRAWTO 47,37
164 PLOT 69,38:PLOT 47,38
170 LH=9:RH=69:LS=10:RS=68:T=32
172 COLOR 2:PLOT 31,31:DRAWTO 47,31
174 PLOT 31,33:DRAWTO 47,33
```

```
176 PLOT 31,32:PLOT 47,32
200 COLOR 3:GOSUB 900
202 P=PEEK(17641):POKE 764,0
220 IF P<23 THEN 250
221 SETCOLOR 4,7,8:IF LS>30 THEN 290
222 COLOR 2:PLOT 1,39:DRAWTO 40,0
223 GOSUB 850
224 PLOT LS,38:LS=LS+1
225 H=40-X:Y=IF (H>0) AND (H<4) THEN C
OLOR 3:PLOT LH,35:LH=LH+2:GOSUB 860
245 COLOR 4:PLOT 1,39:DRAWTO 40,0:GOTO
290
250 IF P<37 THEN 290
251 SETCOLOR 4,7,8:IF RS<48 THEN 290
252 COLOR 2:PLOT 78,39:DRAWTO 39,0
253 GOSUB 850
254 PLOT RS,38:RS=RS+1
255 H=41-X:Y=IF (H>0) AND (H<4) THEN C
OLOR 3:PLOT RH,35:RH=RH+2:GOSUB 860
288 COLOR 4:PLOT 78,39:DRAWTO 39,0
290 IF (LS>30) AND (RS<48) THEN 800
296 IF T>45 THEN 800
300 COLOR 4:GOSUB 900
301 SETCOLOR 4,15,8
302 IF (X<57) OR (X<22) THEN X1=X-1:FO
R I=1 TO 15:SOUND 0,I,Y,10,7:NEXT I
305 IF (Y<1) OR (Y>20) THEN Y1=Y-1:T=T
+.5:FOR I=1 TO 15:SOUND 0,X,Y,10,7:NEXT
I
307 X=X1:Y=Y+Y1
309 COLOR 3:PLOT T,32
320 IF T>45 THEN 800
330 SOUND 0,0,0,0
350 GOTO 200
599 GOTO 599
800 PRINT:PRINT "PRESS RETURN for n
ext game ? "
810 P=PEEK(17641):IF P=12 THEN RUN
815 SOUND 0,RND(1)*250,10,7
820 GOTO 810
850 FOR I=1 TO X+10:SOUND 0,1,10,11
852 NEXT I:SOUND 0,0,0,0:RETURN
860 SETCOLOR 4,3,9:FOR J=10 TO 190
864 SOUND 0,3,12,9:NEXT J
868 COLOR 4:GOSUB 900
870 X=INT(RND(1)*25)+25
872 Y=INT(RND(1)*15)+5
878 RETURN
900 PLOT X+1,Y:PLOT X+2,Y+1:PLOT X,Y+1
904 PLOT X+1,Y+2:PLOT X+1,Y+1:RETURN
```



RUNS ON AN

ATARI IN 8K

RUNS ON AN APPLE IN 16K

YOU have been chosen as the best pilot for the job, only the job looks very bad indeed. You have to fly ahead of your mother ship and blast a path through a severe meteor storm.

This is also a paying proposition. You are given points (the monetary system is in points) for just staying alive by dodging the meteors. If you don't want to make your first million within your own lifetime, then just dodge.

But for each meteor you destroy you get 100 points. When the situation gets very dangerous, you can go into hyperspace. I must warn you to use this as few times as possible because you could come out of hyperspace right on top of a meteor, or be hopelessly lost in space. Within a short time, however, you will be navigating through the meteors with the best of them.

Now for the variable list:

AS- Used for temporary storage of INKEY\$ and used all over.

ES- this is what your shot looks like.

G- This is the PRINT at location of your shot. If it is zero, then you aren't shooting.

HP- High score

HPS- The name of the high scorer.

I- Used for FOR-NEXT timer loops.

L- The location of your ship in video memory.

P- temporary storage for PEEK (14400).

PO- Your score.

S- PRINT at location of the ship.

S1, S2, S3 - PRINT at location of debris.

SS- This is what your ship looks like.

S1\$, S2\$, S3\$ - What the debris looks like.

T- Used for FOR-NEXT timer loops.

YS- Used to ask, "DO YOU WANT TO TRY ANOTHER MISSION?"

Now to explain myself a little.

First, the whole secret to this game is the screen's scrolling ability. When the screen is made to scroll, everything on it seems to go flying past. That is the way I made such a fast game with such a small amount of typing.

This, however, is the most useful technique I have found. You may have seen a table that has the keyboard memory on it.

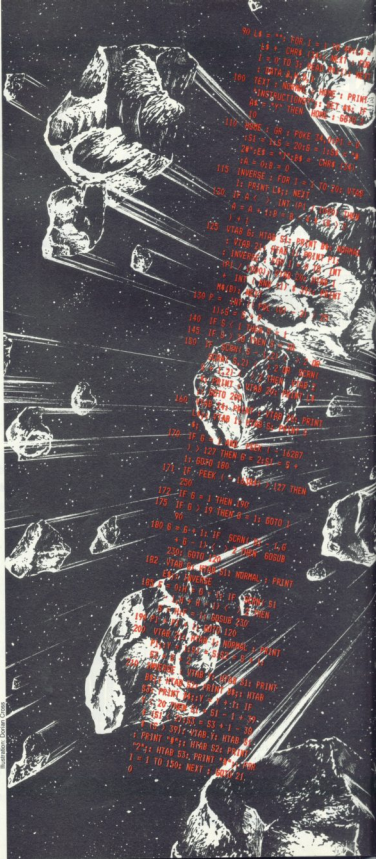
Actually, there is no real memory between location 14336 and 15359.

It is a bunch of switches that were mapped into a place in memory.

The author, Mr Harper, says he encourages people to edit the daylight-out of his program. So if you think you can make Meteor Storm a better game to play, feel free.

BY ROY HARPER

Illustration: Dorcas Cross





SWOOPING across the surface of the alien planet you prepare your ship for battle. Your laser cannon is armed as you look out for strategic targets. A city looms in front of you — and the attack is on!

In this arcade style game you are piloting an anti-grav air car. It is equipped with a laser and has two speeds — attack and super-fast Zype drive. The idea is to cause as much havoc and destruction in the city as you can.

But you must beware of the deadly super-force-field gravity traps. You have warning indicators which light up when you approach one of these danger zones. The game requires quick reactions and mental awareness.

If you want the fuel to last longer just modify the variable "F" in lines 1000 and 1980 — the greater the value the longer the fuel lasts.

As soon as the warning indicators light up alerting you to a danger zone the force-field trap will be placed directly in front of your flier at the bottom of the screen. Only the centre of your craft is affected by the hazards.

Although the game is written in easily understandable Basic Mr Firmin says it is quite fast in execution.

BY PAUL FIRMIN

```

10 REM      **** Anti Grav. Flier ****
20 REM A Prog. by P.E.Firmin (Futura Software)
30 REM Produced for Computer & Video Games Mag.
40 REM      Written Jan.1982
50 CLEAR 200
60 CLS:TS=0:TS="* ANTI GRAV FLIER *"
70 FOR T=1 TO LEN(TS)
80 POKE 3017+T,ASC(MID$(TS,T,1)):NEXT
90 TS="Futura Software (C) 1982"
100 FOR T=1 TO LEN(TS)
110 POKE 3041+T,ASC(MID$(TS,T,1)):NEXT
120 REM - Initialisation
130 DEF FN(X)=INT(RND(1)*46)+1
140 DEF FNS(S)=INT(RND(1)*5)+1
150 DOKE 3200,25311:DOKE 3202,312
160 DOKE 3204,10351:DOKE 3206,10927
170 DOKE 3208,-8179:POKE 3210,233
180 DOKE 4100,3200
190 SCREEN 6,6
200 PRINT"Would you like instructions "
210 PRINT"(Y or N) ?"
220 A=USR0:IF A=0 THEN 220
230 IF A=99 THEN 1620
240 IF A=70 THEN 1960
250 GOTO 220

```

ANTI GRAV FLIER




```

260 GOSUB 1460
270 W=25:Y=7:CK=1
280 REM - Main Game
290 SCREEN 1,15
300 R=USR(0)
310 F=F-1:IF F<0 THEN GOSUB 1000
320 IF PEEK (3074)=64 THEN Y=Y-1
330 IF PEEK (3075)=64 THEN X=X-1
340 IF PEEK (3076)=64 THEN Y=Y+1
350 IF PEEK (3077)=64 THEN X=X+1
360 IF PEEK (3079)=16 THEN CK=1
370 IF PEEK (3079)=0 THEN CK=2
380 IF X<2 THEN X=2
390 IF X>47 THEN X=47
400 IF Y>14 THEN Y=14
410 IF Y<2 THEN Y=2
420 POKE W,32:POKE W-1,32:POKE W+1,32
430 PRINT IF CR=1 THEN 1070
440 IF CK=2 THEN PRINT
450 P=1993+X+Y*64
460 IF PEEK (P+64)=255 THEN CR=1
470 IF PEEK (P)=255 THEN CR=1
480 IF PEEK (P)=160 THEN 1130
490 POKE P,170:POKE P-1,92:POKE P+1,47
500 IF PEEK (3080)=16 THEN GOSUB 690
510 R=USR(0):W=P
520 REM - Plot Planet Surface
530 IF RND(1)<.9 THEN POKE 2954+FN(X),255
540 IF RND(1)>.1 THEN 600
550 RESTORE 570:RN=FN(S)
560 FOR V=1 TO RN:READ CH:NEXT
570 DATA 7,186,14,7,14
580 POKE 2954+FN(X),CH
590 REM - Detect & Set Up Grav Force-Field
600 IF K=0 THEN 640
610 K=K+1
620 IF K=16 THEN K=0:POKE 3016,184:POKE 3036,184
630 GOTO 300
640 IF RND(1)<.95 THEN 300
650 K=1:POKE 2953+X,160
660 POKE 3018,185:POKE 3036,185
670 GOTO 300
680 REM - Fire Laser Gun
690 FOR I=1 TO 6
700 L=P+I*64:IF L>3001 THEN 740
710 PK=PEEK (L):IF PK<32 THEN 810
720 POKE L,148
730 NEXT
740 ST=I-1
750 FOR J=1 TO ST
760 L=P+J*64
770 POKE L,32
780 NEXT
790 RETURN
800 REM - Laser Hit
810 IF PK=7 OR PK=14 THEN 840
820 IF PK=106 THEN 950
830 GOTO 740
840 POKE L,42
850 RESTORE 930:RN=FN(S)
860 FOR T=1 TO RN:READ SC:NEXT
870 TC=TC+SC
880 S$=STR$(SC):FOR T=1 TO LEN(S$)
890 POKE L-3+T,ASC(MID$(S$,T,1)):NEXT
900 S$=STR$(TC):FOR T=1 TO LEN(S$)

```

```

910 POKE 3043+T,ASC(MID$(S$,T,1)):NEXT
920 GOTO 740
930 DATA 50,100,150,200,300
940 REM - Hit Fuel Supply
950 POKE L,129
960 IF FL=10 THEN 740
970 FL=FL+1:POKE PZ,128:PZ=PZ+1
980 GOTO 740
990 REM - Fuel Check
1000 FL=FL-1:F=50:PZ=PZ-1:POKE PZ,32
1010 IF FL=0 THEN 1030
1020 RETURN
1030 GOSUB 1460:SCREEN 17,4
1040 PRINT"+ OUT OF FUEL +@"
1050 GOTO 1300
1060 REM - Crashed
1070 FOR T=1 TO 3:RESTORE 1110:FOR I=1 TO 7
1080 READ CH:POKE P,CH:POKE P-1,CH:POKE P+1,CH
1090 NEXT:NEXT
1100 W=1:GOTO 1220
1110 DATA 42,129,4,255,150,127,42
1120 REM - Super Gravity Force Field
1130 FOR T=1 TO 5:CH=64
1140 POKE P,CH:POKE P+1,CH
1150 POKE P-63,CH:POKE P-2,CH
1160 POKE P-64,CH:POKE P-65,CH
1170 POKE P-2,CH:POKE P-1,CH
1180 POKE P+63,CH:POKE P+64,CH:POKE P+65,CH

```

RUNS ON A NASCOM II

WITH GRAPHICS ROM IN 5.5K

PRODUCED FOR COMPUTER AND

VIDEO GAMES BY FUTURA SOFTWARE

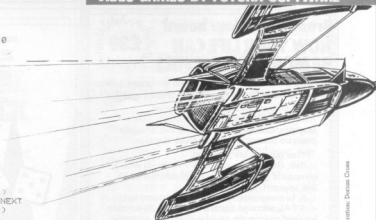


Illustration: Dennis Coles



Run **BBC** type BASIC on your ATOM then switch back to ATOM BASIC

Available now from Acornsoft, a 20k BBC ROM conversion module which can be added inside an Atom. It will support the full set of BBC - type BASIC commands. The BASIC syntax is identical so all programs that don't rely on the BBC hardware can be run on the Atom without any modification.

The module is fitted in parallel with Atom BASIC and may be selected by a switch or from the keyboard if certain modifications are made. It consists of 16k BASIC ROM, 4k operating system ROM and an additional 2k RAM that can be used by the Atom as well.

Complete with manual

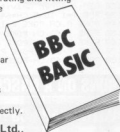
A comprehensive BBC - type BASIC manual is supplied with every set giving full operating and fitting instructions, alternatively the module can be fitted by your dealer.

The price is £49.95 including VAT.

If you don't have a dealer near you just write to us with a cheque at the address below, or credit card holders can ring Cambridge (0223) 316039 and order directly.

Dept CVG , Acornsoft Ltd.,
4a Market Hill, CAMBRIDGE CB2

ACORNSOFT



ingenious !

16K
£279



32K
£310

Genie II business system with key pad £295.

IN BLACKPOOL

- * SOFTWARE
- * PERIPHERALS
- * EPSON PRINTERS
- * BOOKS

COMMODORE VIC 20



Only
£189.95



LEISURONICS COMPUTER STORES
64 Abingdon Street, Blackpool,
Lancashire. Tel: 0253 27091

Please add 15% VAT to all prices.

Brand new colour board NOW YOUR LIFE CAN BE MORE COLOURFUL! £39

The board fits inside the Atom and generates colour output suitable for all makes of monitors and TV's.

Two colour palettes can be achieved
Red, Yellow, Green, Blue and White, Cyan,
Magenta, Orange. In text modes this provides
green on blue or orange on black displays.

Three outputs are provided:—

- Red, Green, Blue drives at TTL levels with a composite sync, the polarity of which may be link selected.
- A 1v composite video in monochrome only.
- A PAL encoded signal on Channel 36 suitable for feeding into the aerial socket on a domestic television.

You can fit the board yourself using a fine soldering iron or your dealer will fit it for you. The board can be used in a minimum Atom with the existing power supply, or if used in a maximum Atom a 5V externally regulated supply will be necessary.

Available from all Acorn Dealers or direct from Acorn at £45.24 inc VAT and p+p. Credit card holders can ring (0223) 245200 and place their orders direct.



Acorn Computers
Fulbourne Road,
Cherry Hinton, Cambridge

PSION COMPUTERS

ZX81-16K RAM BACKGAMMON

the oldest game on the youngest computer

"Backgammon is a great game—easy to learn, fast, exciting, a perfect game of chance and skill. No better for those devoted ones!"

£5.95

including VAT and postage

Psion Computers brings you a program of the highest quality to play Backgammon on the Sinclair ZX81. It plays with remarkable skill using high-speed machine code to evaluate the statistics and strategy of the game—outstanding display, rolling dice, doubling cube, 4 levels of play.



Also from PSION
£3.85
including VAT and postage



SOFT FANTASY GAMES

Sale & Perfection Systems, Suite 8 Sinclair's Island
Role playing adventure style games

Dear Sir,
I have ordered the following games from you:
1. The Great Escape
2. The Great Escape
3. The Great Escape
4. The Great Escape



PSION Games are factory produced by high-speed automated equipment under strict quality control. Colourful printed inserts contain detailed description and instructions.

I enclose a postal order / cheque for £

☐ Backgammon (£5.95) ☐ Fantasy Games (£3.85)

Name

Address

To: Psion Ltd
2 Huntworth Mews
Gloucester Place
London NW1 6DD



FOOTBALL MANAGER

A GREAT NEW GAME
from

Addictive Games

for ZX81, ZX80, TRS80, VIDEO GENIE

JUST LOOK AT THESE FEATURES

- 4 Divisions • Promotion & Relegation •
 - F.A. Cup • Full League Tables •
 - Transfer Market (Buy and Sell Players) •
 - Pick your Team for each Match (but watch out for injuries!) •
 - As many Seasons as you like •
 - 7 levels of Play (from Beginner to Genius!) •
 - Managerial Rating (tells you how good you REALLY are!) •
 - Save Game Facility (continue again another time) •
- All this and much much more packed tightly into 16K RAM

"IF YOU LIKE FOOTBALL
YOU'LL LOVE THIS GAME"

HARDWARE REQUIRED:

ZX81/ ZX80	TRS80/ Video Genie
8K ROM 16K RAM	LEVEL II 16K RAM

To Order send Cheque/P.O. for £9.95

made payable to:
ADDICTIVE GAMES

P.O. BOX 278
CONIBURROW
MILTON KEYNES
MK14 7NE

PLEASE STATE COMPUTER

ZX81 PROFESSIONAL 16K RAM PACK

£37.50

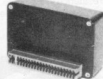
Inc. V.A.T.,
P&P,
& CASE


SPECIAL OFFER FREE

4K 'SPACE INTRUDERS'

Cassette worth £4.95 with every order received by 16-5-82

FREE



+  + ONE YEAR
GUARANTEE

Cased in smooth black plastic
FULLY COMPATIBLE with the ZX
PRINTER. Increased stability has
been achieved with a piece of foam
(supplied) fitted above the edge
connector to prevent wobble.

ALSO available 64K R.A.M.s and SOFTWARE send S.A.E. for details.

Cheque with order or quote Access or Barclaycard number
to:

HEWSON CONSULTANTS (C.V.G.), 7 Grahame Close,
Blewbury, Didcot, Oxon OX11 9QE. TEL: (0235) 850075
phoned orders welcome.

SILVERSOFT

personal computer software

16K/ZX 81 SOFTWARE

NEW! MACHINE CODE ARCADE GAMES

"SPACE INVADERS"

Simply the best yet, this version is the nearest you can get to the real thing, on the ZX81.

"ASTEROIDS"

This is a de-luxe implementation of this game, which includes 3 sizes of asteroids, alienships, 5-levels of play & full ship controls.

"ARCADE-DROPOUT"

Excellent implementation of this exciting arcade game. Destroy the aliens, before they fill up the chutes and destroy you.

"STARTREK"

16K STARTREK: Exciting space adventure game including klingon, starbases, phasors, 8x8 galaxy, etc.

"SUPER-WUMPUS"

16K SUPER-WUMPUS: Can you hunt and catch the mysterious wumpus in his underground labyrinth? Intriguing underground adventure.

"GRAPHIC GOLF"

16K GRAPHIC GOLF: Test your golfing skills on SILVER-SOFT'S 18-hole golf course. Many hazards including lakes, trees, streams, rough, etc.

"3D-MYSTERY MAZE"

16K 3D MYSTERY MAZE: Amazing three dimensional maze, uses fast m/c display, hundreds of different mazes. Find your way through the maze in 3D.

"GAMES PACK 1"

16K GAMES PACK: Fantastic value for money, nearly 50K of programs on one cassette. Five games including "Real Time Graphic" Lunar Lander, Starwars, Ham-murabi, Minefield, Mastermind.

Prices ASTEROIDS OR DROPOUT £5.95
OTHERS £4.95

Send S.A.E. for catalogue. When ordering 2 or more cassettes deduct £1.00

Cheques/P.O. payable to SILVERSOFT

Name

Address

SILVERSOFT (Dept CVG)
40 Empress Avenue, Ilford, Essex.

**EXPLORE THE WORLD OF ELECTRONICS WITH
THE HELP EACH MONTH OF THE NEW STYLE**

Hobby Electronics

The May issue has many exciting features including

- POPULAR COMPUTING — an introduction to the world of computers
- INTO RADIO — if you want to become a radio ham we tell you how
- SPECIAL PROJECTS — you can save money with our complete projects which in the May issue tell you how to build a DIGITAL THERMOMETER, an AUDIO SIGNAL GENERATOR and an ECHO REVERB
- ELECTRONIC REVOLUTION — we cover the developments in electronics from VOLTA to VIDEO
- SINES OF THE TIMES — how to make waves with electronics

BUY YOUR COPY TODAY!



Labyrinth places you in a maze of gigantic proportions. But you are not alone! A minotaur searches for you, seeking a grisly meal. You must find weapons, spells, and treasures. You must deal with ghosts and cave gnomes. You must avoid the minotaur until the moment is right for the final battle. **TAPE £10⁹⁵**

3D-Adventures

TRS80 VIDEO GENIE

3-D means that as you wander through the mazes and buildings, a full screen graphic display constantly shows your position in a perspective format as though you were actually there! This "rat's eye" view adds an entirely new dimension to adventure.

English language commands can be entered at any time to manipulate your environment. The command sets are extensive and sophisticated.

Deathmaze 5000 and Labyrinth allow the traditional one and two word commands. Asylum incorporates our Advanced Language Interpreter (ALI), which allows full sentence input. Deathmaze and Labyrinth consist of over 550 locations! Asylum tops 1200 locations!

Deathmaze 5000 places you on the top floor of a five storey building. Each floor is a maze of twisting passageways. Floors are connected by elevators and open pits. You have but one goal.

ESCAPE ALIVE! Where is the only door out of this nightmare? Monsters, bats, mad dogs, hunger, and many more horrors plague your every step as you struggle to escape. **TAPE £10⁹⁵**

Asylum places you on a cot in a small room. Periodically, a janitor lobbs a hand-grenade through the window of your locked door. What you do next could mean survival and escape! It could also mean permanent residence in the home for Deathmaze survivors! To leave, you will have to deal with guards, fellow survivors, doctors, the infamous Crazy Carpenter, and much, much more. Don't expect to get out any time soon! **TAPE £12**

THE ESSENTIAL SOFTWARE COMPANY
(Viscount Ltd.) 01-837 3154
47 Brunswick Centre, London WC1N 1AF

<input type="checkbox"/> I have a <input type="checkbox"/> Please send me your software catalogue <input type="checkbox"/> I enclose a stamped self addressed envelope <input type="checkbox"/> Please send me <input type="checkbox"/> I enclose a cheque/postal order for £ (plus 70p post & packing)	microcomputer Name _____ Address _____ Postcode _____ My ACCESS No is _____
--	--


```

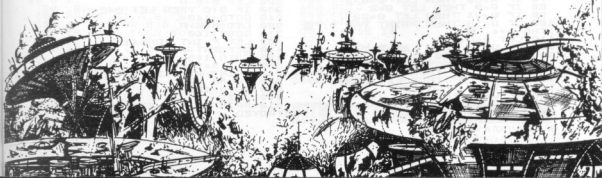
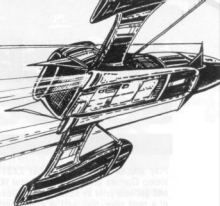
1190 IF CH=64 THEN CH=32:GOTO 1140
1200 NEXT N=2:GOTO 1220
1210 REM - End Game
1220 GOSUB 1460
1230 SCREEN 16:PRINT"-- ATTACK OVER --"
1240 IF N<1 THEN 1270
1250 SCREEN 11,5
1260 PRINT"* Crashed into Buildings ! *"
1270 IF N<2 THEN 1300
1280 SCREEN 9,5
1290 PRINT"Trapped by Gravity Force-Field !"
1300 RC=0:IF TC=100 THEN RC=1
1310 SCREEN 14+RC,7
1320 PRINT"You scored"TC"Points."
1330 IF TC<TS THEN 1370
1340 TS=TC
1350 SCREEN 4,9:PRINT"This is the Highest "
1360 PRINT"recorded score so far!"GOTO 1390
1370 SCREEN 8,9:PRINT"The Highest recorded "
1380 PRINT"score is"TS
1390 SCREEN 14,13:PRINT"Another Game (Y or N) ?"
1400 A=USR(0):IF A=0 THEN 1400
1410 IF A=89 THEN 1960
1420 IF A=78 THEN 1440
1430 GOTO 1400
1440 CLS:PRINT"Hope you enjoyed the Game!"
1450 END
1460 REM - Clear 15 Line Screen
1470 FOR I=1 TO 15:SCREEN 1,I
1480 PRINT CHR$(27):NEXT
1490 RETURN
1500 REM - Pause For Key Press
1510 SCREEN 11,14
1520 PRINT"* Hit any key to continue *"
1530 FOR I=1 TO 500
1540 A=USR(0):IF A<>0 THEN RETURN
1550 NEXT
1560 SCREEN 11,14:PRINT CHR$(27)
1570 FOR I=1 TO 200
1580 A=USR(0):IF A<>0 THEN RETURN
1590 NEXT
1600 GOTO 1510
1610 REM - Instructions
1620 GOSUB 1460:SCREEN 1,1
1630 PRINT" As you go speeding across the surface of an
1640 PRINT"alien Planet in your laser equipped anti grav.
1650 PRINT"air car the idea is to wreck as much havoc and"
1660 PRINT"destruction on the city below you as you can."
1670 PRINT"You steer your craft \ / by using the four"
1680 POKE 2338,170
1690 PRINT"cursor arrow keys \ / and fire your laser"
1700 POKE 2397,13:POKE 2401,11:POKE 2403,9
1710 PRINT"gun by Pressing the \SPACE-BAR\."
1720 PRINT"Your craft also has two selectable speeds."
1730 PRINT"Press \1/ for normal attack speed and \2/ for"
1740 PRINT"super fast \Zupe\ drive."
1750 PRINT"Aim for the strategic targets \ / a nd \ / to"

```

```

1760 POKE 2730,7:POKE 2738,14
1770 PRINT"score Points (50-300)."

```



sinclair selection

Play around with your Sinclair ZX81! *Computer and Video Games* proudly presents four 1K games thought up and put into print by some of our readers. Enjoy the thrills of a road race, take part in a ski spectacular, blast little green men as they invade the galaxy and try and avoid the deadly projectile. It's over to you . . .

SKI

Test your skills on the ski-slopes with this program which can be modified to give two other games.

The object is to steer a skier through as many slalom gates as possible. Press Q to turn left, P to turn right.

By changing a couple of lines slightly this game can be changed to "RACER" viz:—

Change these lines to the following.

```
100 IF W = 4 THEN PRINT TAB Q: "XXXXXXXXX"
```

```
120 IF W = 4 THEN LET T = T + 1
```

```
130 PRINT AT 3,M: "X"
```

```
170 IF T = 60 THEN STOP
```

```
180 IF W = 5 THEN LET W = 1
```

All other lines stay the same.

By changing the "RACER" listing still further we get "WORMHOLE". Keep the worm in his hole.

```
10
```

```
40
```

```
60 IF X 50 THEN LET Q = Q + 1
```

```
70 IF X 50 THEN LET Q = Q - 1
```

```
100 PRINT TAB Q: "XXXXX"
```

```
110
```

```
120
```

```
130 PRINT AT 10,M: "V"
```

```
170
```

```
180
```

All other lines the same.

I have used the overprinted X to represent a half-tone square, i.e. CHR\$ 8.

BY DEREK FAIRLESS

```
10 LET U=1
20 LET Q=10
30 LET M=15
40 LET T=1
50 LET X=INT (RND/.01)
60 IF X<50 THEN LET Q=Q+2
70 IF X>50 THEN LET Q=Q-2
80 IF Q=0 THEN LET Q=2
90 IF Q=24 THEN LET Q=22
100 IF U=15 THEN PRINT TAB Q; "X"
110 LET Q=4: "X"
120 IF U=15 THEN LET T=T+1
130 PRINT AT 10,M: "XXXX"
140 LET A$=INKEY$
150 IF A$="Q" THEN LET M=M-1
160 IF A$="P" THEN LET M=M+1
170 IF T=30 THEN STOP
180 IF U=15 THEN LET W=1
190 SCROLL
200 GOTO 50
```



EARTH Vs THE FLYING SAUCERS

An invasion fleet of flying saucers is swooping down on Earth and only you — the pilot of a jet fighter — stand in their way. The jet fighter appears on the left side of the screen and can be moved up and down using the keys 1. and A. The P key controls your air to air missiles.

BY D.E. HEALEY

```
10 LET T=50
20 LET A=PI/PI
30 LET B=10
40 LET C=PI-PI
50 LET D=3
60 LET F=4
70 LET S=C
80 GOTO 170
90 PRINT AT B,D: " -"
100 LET D=D+A
110 IF B=F AND D=29 THEN GOTO 5
120 IF D<>30 THEN GOTO 90
130 LET D=3
140 CLS
150 IF T=C THEN GOTO 600
160 PRINT AT F,29: "<O>"
170 PRINT AT B,C: "X"
180 IF INKEY$="1" THEN GOTO 220
190 IF INKEY$="A" THEN GOTO 300
200 IF INKEY$="P" THEN GOTO 210
210 IF INT (RND*4)=3 THEN GOTO 400
220 LET B=B-A
230 IF B<C THEN LET B=C
240 GOTO 140
250 LET B=B+A
260 GOTO 140
270 LET F=INT (RND*15)
280 LET T=T-A
290 GOTO 140
300 LET S=S+A
310 PRINT AT F,26: "BOOM"
320 PRASE 30
330 GOTO 400
400 CLS
410 PRINT 5: " FLYING SAUCERS DE
STROYED"
```




GRAND PRIX

Take to the race track in this game of driving skill. The program simulates a track with randomly placed obstacles. Unfortunately due to the limited memory nothing happens if the player crashes into one of these, so a mental note should be taken of the number of obstacles hit and an extra five points added at the end for each collision.

When you have successfully completed the course the game ends and the time you took to cover the distance is shown.

The car accelerates when key six is pressed and is steered by using keys five and eight.

BY JEREMY YOUNGMAN

```

10 REM WRITTEN BY J.S.YOUNGMAN
20 LET A=0
30 LET B=5
40 LET T=0
50 LET R=INT (RND*6)+2
60 SCROLL
70 PRINT "A BANG"
80 LET B=B+(INKEY$="S")-(INKEY$="B")
90 LET A=A+(INKEY$="B")
100 PRINT AT A,B;"B"
110 IF B<1 OR B>6 THEN GOTO 150
120 IF A=21 THEN GOTO 170
130 LET T=T+1
140 IF INT (T/2)*2=T THEN GOTO 140
150 GOTO 50
160 PRINT AT A,2;"BANG"
170 GOTO 180
180 PRINT AT 21,1;"FINISH"
190 PRINT AT 11,15;"TIME";T
200 PAUSE 32768
210 CLS
220 RUN

```

AVOID THE PROJECTILE

In this game the player has to avoid a self guiding projectile while attempting to reach home base.

The object of the game is to move from the top corner of the screen to the bottom — without getting hit by the projectile. To make the game more difficult simply use a V by 15 array. To move your man up and down use the V and N keys, to move left and right use B and M.

Another way to alter the difficulty of the game is to change the 4 lines 70-100.

BY J. SOUTHWARD

```

1 REM A JS PRODUCTION
2 PRINT "AVOID THE PROJECTILE"
3 PRINT "IT WILL MOVE TOWARDS YOU"
4 PRINT "U MOVES YOU DOWN"
5 PRINT "B MOVES YOU ACROSS"
6 PRINT "N,M ARE THE SAME ONLY BACKWARDS"
7 PRINT "PRESS NEW LINE"
8 INPUT DS
9 CLS
10 SLOW
11 PRINT AT 15,15;"HOME"
12 LET R=15
13 LET T=15
14 LET S=0
15 LET X=1
16 LET Y=1
17 LET U$=""
18 PRINT AT X,Y;U$
19 LET D$=INKEY$
20 PRINT AT R,T;" "
21 PRINT AT X,Y;" "
22 IF D$="U" THEN LET X=X+4
23 IF D$="B" THEN LET Y=Y+4
24 IF D$="N" THEN LET X=X-4
25 IF D$="M" THEN LET Y=Y-4
26 IF Y>15 THEN LET Y=15
27 IF X>15 THEN LET X=15
28 IF Y<0 THEN LET Y=0
29 IF X<0 THEN LET X=0
30 IF Y+4>T THEN LET T=T-1
31 IF Y+4>T THEN LET T=T+1
32 IF X>R THEN LET R=R+1
33 IF X<R THEN LET R=R-1
34 THEN GOTO 500 AND Y<T AND Y+9>T
35 GOTO 500
36 IF X=15 AND Y=15 THEN GOTO 1000
37 PRINT AT R,T;"M"
38 LET S=S+1
39 GOTO 50
40 CLS
41 PRINT "BOOM"
42 PAUSE 10
43 CLS
44 GOTO 2000
45 CLS
46 PRINT "YOU HAVE ESCAPED"
47 LET S=S+5
48 PRINT "YOUR SCORE IS ";S

```

ALL RUN IN 1K

Step by step with the computer system designed for tomorrow.

- ★ 6502 Microprocessor
- ★ 2K Monitor TANBUG
- ★ Intelligent socket accepts keypad or full ASCII Keyboard
- ★ Chunky Graphics and Lower Case Options
- ★ Connects to unmodified B/W or Colour TV

For the first time buyer or experienced user, Microtan 65 is a superb route into personal computing. If you are looking for a sophisticated machine with the capability of expansion into a professional system, then this is the



computer for you. Step by step with the computer system designed for tomorrow.

6502 Microprocessor

Probably the most popular CPU (central processing unit) for personal computers, having a powerful instruction set and architecture.

2K Monitor TANBUG

The built-in 'mind' of the machine, TANBUG controls all system functions and gives comprehensive machine-code facilities. Functions include: set and clear breakpoints, single step through program, execute program, copy block of memory, modify memory locations and much more.

Intelligent keyboard socket

For absolute beginners we can supply an easy to use 20-way Hex keypad; for the more experienced user there is a full typewriter style ASCII keyboard. Either way, Microtan will work out exactly which type you are using and act appropriately.

Chunky Graphics Options

For drawing simple lines and graphs, or for animated games, Chunky Graphics is a low cost answer. This set of chips plug into the Microtan board

Microtan 65

£79.00 Ready
+VAT Built

£69.00 Kit
+VAT

and allow graphics to be built up on the screen at a resolution of 64 rows by 64 columns.

Lower Case Option

To extend the character set to 128 characters, allows for real descenders on lower case characters and a set of extra symbols and characters for simple graphics.

Microtan Accessories

20-way Hex keypad MPS 1 Basic power supply

Aerial connector lead

Full ASCII Keyboard

MPS 2 Full system power supply

Mini — motherboard

Microtan is available

ready-built or as a kit.

We recommend that

you should have some

soldering experience

before attempting the

Microtan Kit, although

if you do run into

problems you can

make use of our 'Get

you Going' service

(telephone for details).

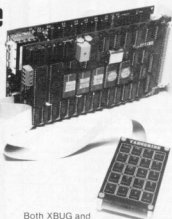
TANEX

- ★ 7K Static Ram
- ★ 10K Microsoft Basic
- ★ 32 Parallel I/O lines
- ★ 1 Serial I/O port
- ★ XBUG
- ★ Cassette Interface

The first step in expanding your system. Tanex provides the extra facilities necessary for the serious programmer. Memory expansion: Tanex has provisions for up to 7K of static RAM and up to 14K of EPROM using 2716 or 2732 chips.

XBUG and BASIC

XBUG is a 2K extension to TANBUG that contains a mnemonic assembler and disassembler and cassette firmware running at 300 Baud CUTS, standard or high speed. 2400 Baud Tangerine standard with 6 character filenames. Tangerine have taken out a full O.E.M. licence for Microsoft BASIC, the microcomputer industry standard, this is a full feature implementation with interrupt and machine code handling, and a superb program editor.



Both XBUG and BASIC plug directly into Tanex and are supplied with comprehensive user manuals.

Parallel I/O

When fully expanded Tanex includes two V.I.A.s (Versatile Interface Adaptors) which implement the cassette interface and the parallel I/O ports. Software in TANBUG V2.3 enables you to plug in and use a Centronics type printer. The two V.I.A.s also contain counter timers that can be used for a variety of applications enhanced by the use of the integral handshake facilities.

Serial I/O

Also on the expanded board is a serial I/O port that can be used to interface RS232 or 20Ma loop terminals or VDU's, again all controlled by TANBUG V2.3.

Dealer and O.E.M. enquiries welcomed

tangerine
computer systems ltd

The Science Park, Milton Road,
Cambridge, CB4 4BH.

TO TANGERINE COMPUTER SYSTEMS LTD.
THE SCIENCE PARK, MILTON ROAD,
CAMBRIDGE CB4 4BH.

- PLEASE SEND ME:
- ☐ MICROTAN IS READY BUILT £82.20 incl. VAT + P&P
 - ☐ MICROTAN IS KIT £69.00 incl. VAT and P&P
 - ☐ TANEX (MINI CONFIG) KIT £82.00 incl. VAT and P&P
 - ☐ TANEX (MINI CONFIG) ASSEMBLED £82.45 incl. VAT and P&P
 - ☐ EXPANDED TANEX KIT £104.88 incl. VAT and P&P
 - ☐ EXPANDED TANEX ASSEMBLED £116.18 incl. VAT and P&P
- PLEASE SEND ME THE NEXT SIX ISSUES OF SODAS GAZETTE AT £15.00

I enclose my cheque for £
or debit by Access/Barclaycard

Signature

Name

Address

..... (Block capitals please) CVG05

MINOTAUR

Do you enjoy solving mazes? Well, this program will provide a different one each time it is run. Just watch the computer draw out a maze while you try to work out the right path.

When the computer is finished drawing put that plan into action — and do it quickly as you have to race through the maze against the clock.

The program is built on algorithm, which will produce a maze which has one, and only one, path from a cell — the little "rooms" which make up the maze — to another cell.

The algorithm is as follows:

1. Fill the maze with little cells, no one connected to any other. (lines 40-80 in the program)
2. Choose one of them and call it the "mother cell" (line 95). It will be the "present position".
3. Record cells which aren't connected to any other cell and border on the present position (lines 100-140).
4. If there are no such cells, return to the previous position. If you can't do that, because you're in the mother cell, is the maze ready. (lines 150-160)
5. Choose randomly one of the recorded cells. (line 180)
6. Connect that cell to the present position, and record in that cell from where you connected it. (lines 190-220)
7. Move into that cell. (lines 230-260)
8. Go to step 3. (line 270)

Lines 1-3 show the control keys and must be omitted to make the program fit in 3K. Lines 12-30 initiates the screen (Poke 36879 selects the colour of the screen).

Lines 1000-1035 make the entrance and the exit of the maze and set the time.

Lines 1040-1100 are the race part of the program.

Lines 1110-1190 play a little tune when you have reached the exit.



Illustration: Dennis Cross

BY MATS OHRMAN

RUNS ON A VIC-20 IN 3-5K

```

1 REM"MOUSE DOWN"MOUSE UP"MOUSE LEFT"MOUSE RIGHT"
2 REM"HOME"CLR"INST"MODE"
3 REM"BLK"LIGHT"RED"DOWN"UP"DOWN"LEFT"RIGHT"ON"OFF"
4 REM"*****"
5 REM"*****"MINOTAUR (C) 1982 I MATS OHRMAN
6
7
8 PRINTCHR$(142)"MI";
9
10 POKE36879,25
11
12 INPUT "INSTRUCTIONS";A$;IFLEFT$(A$,"Y"),1<0;"N"THEN GOSUB5000
13 POKE36879,93
14 PRINT"J"
15
16 XM=22:YM=21
17 DIMMZX(XM,YM),UX(3)
18 FORL=36400TO36905:POKE(L,7:NEXTL
19 FORL=1TO20:MZX(0,L)=10:MZX(XM,L)=10:NEXTL
20 FORL=1TO21:MZX(L,0)=5:MZX(L,YM)=5:NEXTL

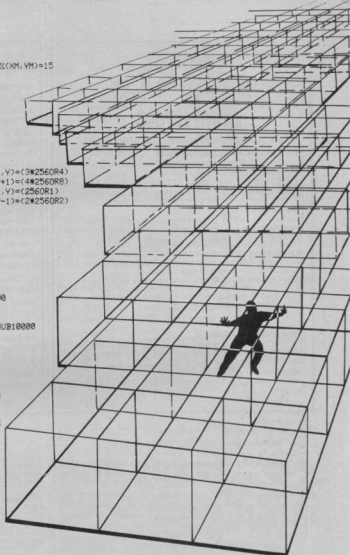
```



```

90 MZ(0,0)=15:MZ(0,YH)=15:MZ(XH,0)=15:MZ(XH,YH)=15
95 X=10:Y=10
100 A=0
110 IF MZ(X-1,Y)=0 THEN UX(A)=1:A=A+1
120 IF MZ(X,Y-1)=0 THEN UX(A)=2:A=A+1
130 IF MZ(X,Y+1)=0 THEN UX(A)=3:A=A+1
140 IF MZ(X+1,Y)=0 THEN UX(A)=4:A=A+1
150 IF A=0 AND X=10 AND Y=10 THEN 1000
160 IF A=0 THEN R=INT(MZ(X,Y)/256):GOTO 2030
170 B=INT(RND(1)*8(A+1)):IF B=0 THEN 170
180 R=UX(B)
190 IF R=1 THEN MZ(X,Y)=(MZ(X,Y)OR1):MZ(X-1,Y)=(3*256OR4)
200 IF R=2 THEN MZ(X,Y)=(MZ(X,Y)OR2):MZ(X,Y-1)=(4*256OR8)
210 IF R=3 THEN MZ(X,Y)=(MZ(X,Y)OR4):MZ(X+1,Y)=(256OR1)
220 IF R=4 THEN MZ(X,Y)=(MZ(X,Y)OR8):MZ(X,Y-1)=(2*256OR2)
225 GOSUB 1000
226 POKE 38400+22*X+Y,7
230 IF R=1 THEN X=X-1
240 IF R=2 THEN Y=Y-1
250 IF R=3 THEN X=X+1
260 IF R=4 THEN Y=Y+1
265 GOSUB 1000
266 POKE 38400+22*X+Y,2
270 GOTO 100
1000 X=1:Y=1:MZ(1,1)=MZ(1,1)OR8:GOSUB 1000
1010 X=1:Y=0:MZ(1,0)=2:GOSUB 1000
1015 X=1:Y=0:MZ(1,0)=2:GOSUB 1000
1020 X=21:Y=20:MZ(21,20)=MZ(21,20)OR2:GOSUB 1000
1025 X=21:Y=21:MZ(21,21)=8:GOSUB 1000
1030 X=1:Y=0
1035 TI$="000000"
1040 OETA$
1045 PRINT"000"INT(TI/6)/10
1046 POKE 38400+22*X+Y,4
1050 IF A$="J"AND(MZ(X,Y)AND1)0 THEN X=X-1
1060 IF A$="N"AND(MZ(X,Y)AND8)0 THEN Y=Y-1
1070 IF A$="H"AND(MZ(X,Y)AND2)0 THEN Y=Y+1
1080 IF A$=" "AND(MZ(X,Y)AND4)0 THEN X=X+1
1090 POKE 38400+22*X+Y,3
1100 IF X022 AND Y021 THEN 1040
1110 RESTORE
1120 POKE 36876,15
1130 FOR L=0 TO 24
1140 READ P,Q
1150 POKE 36875,P:POKE 36876,P
1160 FOR T=0 TO 30:GOTO NEXTT
1170 POKE 36875,0:POKE 36876,0
1180 FOR T=0 TO 10:GOTO NEXTT
1190 NEXT L
1200 PRINT"MMMMMMMPRESS <RETURN>";
1210 OETA$:IFA$0CHR$(13) THEN 1210
1220 RUN
5000 PRINT"=====INSTRUCTIONS:=====
5010 PRINT"THIS PROGRAM DRAWS A MAZE."
5020 PRINT"YOU'RE TO MOVE ACROSS IT IN THE SHORTEST POSSIBLE TIME."
5030 PRINT"WHEN THE MAZE IS READY(TOTALLY RED) DO YOU GUIDE THE LITTLE LIGHT?";
5040 PRINT"SOURCE WITH: 光源"
5050 PRINT" 光源"
5060 PRINT" 光源"
5070 PRINT"THE START IS IN UPPER LEFT CORNER. THE FINISH IS IN THE LOWER RIGHTO NE."
5080 PRINT"MPRESS <RETURN>"
5090 OETA$:IFA$0CHR$(13) THEN 5090
5100 RETURN
10000 IF(MZ(X,Y)AND1)0 AND(MZ(X,Y)AND8)0 THEN P=32+128:GOTO 10040
10010 IF(MZ(X,Y)AND1)0 THEN P=101+128:GOTO 10040
10020 IF(MZ(X,Y)AND8)0 THEN P=99+128:GOTO 10040
10030 P=79+128
10040 POKE 7680+22*X+Y,P
10050 RETURN
20000 DATA 187,4,187,4,201,2,201,4,201,2,195,2,195,2,183,2,163,2,175,6,163,1,175
20010 DATA 183,2,195,2,195,2,201,2,195,2,183,2,163,3,175,1,183,2,183,2,175,2,175
,2,163,6

```



ARTIC COMPUTING

MOVING AHEAD WITH ZX SOFTWARE

ZX CHESS I reduced to £6.50

Very popular machine code program, with six levels of play and an analysis option. Unbeaten except by:

ZX CHESS II now only £12.99

A new improved version, with a faster response time, seven levels of play, and in addition a recommended move option.

ADVENTURES

Exciting machine code games with instant response, choose from the range below.

ADVENTURE 'A' £6.00. You find yourself stranded on an alien planet. Can you reach your ship and escape?

ADVENTURE 'B' £7.00. In a jungle clearing you come across an Inca temple. You must break in, collect treasure and escape alive. Beware. Includes a cassette save routine.

ADVENTURE 'C' £8.00. You are unfortunate enough to be drawn to an alien cruiser. Can you reach the control room and free yourself or will they get you first? Includes a cassette save routine.

GALAXY WARRIOR £3.00

Fast and exciting interactive animated graphics game. Hunt Clingons and go through black holes . . .

GALAXIANS £6.50

All the features of the arcade game in a fast machine code program, swooping attackers, explosions and personalised scoring.

1K GAMES PACK £6.00

and many more. For a catalogue giving full details, please send a s.a.e. to:

ARTIC COMPUTING

396 JAMES RECKITT AVENUE, HULL HU8 0JA

STARWEB...

A COMPUTER MODERATED game from Flying Buffalo, the people who invented the entire hobby.

STARWEB is just one of four games run by ICBM and is probably the most popular game of SF Trade, War, Diplomacy, double crossing Empire Building and Piracy in the world.

STARWEB is played by post by 10 to 15 people who have never met each other and whose instructions are "moderated" by a computer. No knowledge of, or access to, computers is required to play the game (although owning one can help you keep track of what's going on!)

STARWEB is a complex and time consuming game. It's addictive and fascinating and does terrible things to your telephone bill and spare time.

STARWEB costs £1.50 a TURN with a £1 game fee. The rules only cost £1 and contain all you need to know to enter one of the most fanatical hobbies around.

ICBM also offers Battle Plan, rules 75p, £1 a turn, Nuclear Destruction, rules 25p, 50p a turn and Space Battle, rules 30p and turns up to £7.50 each!

ICBM ... PO Box 94, Bath St., Walsall, West Midlands.

Cheques or POs to ICBM.

1981
Rosetta
Stone
Award!

ZX81 ROM EXPOSED!



Dr. Ian Logan, winner of the 1981 Rosetta Stone Award has written three essential books for those who really want to understand the full working of the SINCLAIR ZX81

Understanding Your ZX81 ROM

In this book Dr. Logan gives a complete overview of Z80 machine language using the ZX81 monitor program as an example. Dr. Logan explains the structure of the ZX81 ROM, its peculiarities, and how you can use the ZX81 ROM routines for your own purposes. PLUS a special section which shows how you can squeeze more power into your ZX81 by using machine language and machine language subroutines. Complete with example programs, reference tables, etc.

ZX81 ROM Disassembly Part A

This book is for the programmer that needs complete answers about the ZX81. Dr. Logan has examined all routines in the ROM and here he comments on each one. It covers all ROM locations from 0000H to 0F5BH, and includes all functions except for the routines used in the floating point calculator.

ZX81 ROM Disassembly Part B

In this the companion volume to Part A Dr. Logan covers locations 0F5BH to 10FFFH and includes all routines used in the ZX81 floating point calculator.

OTHER TITLES AVAILABLE

- ★ **Machine Language Programming Made Simple for the Sinclair**
- ★ **Not Only 30 Programs for the Sinclair ZX81: 1K —**
- ★ **Complete Sinclair ZX81 Basic Course** is a 240 page in-depth comprehensive for complete beginners and experienced programmers. Over 100 programs and examples illustrate the use and possibilities of the Sinclair ZX81.
- programming techniques and memory saving devices
- every function covered
- BASIC Course programs available on cassette

Send to: Macmillan House Publishers Ltd, Theobald Road, Birmingham B3 7TH (UK)
(Correspondence to: Gabe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 1NA)

NAME		CVG			
ADDRESS					
POSTCODE					
Understanding Your ZX81 ROM	£8.95	<input type="checkbox"/>	Not Only 30 Programs/Sinclair ZX81: 1K	£6.95	<input type="checkbox"/>
ZX81 ROM Disassembly Part A	£7.00	<input type="checkbox"/>	Machine Language Programming Made Simple	£8.95	<input type="checkbox"/>
ZX81 ROM Disassembly Part B	£8.00	<input type="checkbox"/>	The Complete Sinclair ZX BASIC Course	£17.50	<input type="checkbox"/>
Basic Course Programs on Cassette	£2.50	<input type="checkbox"/>	Postage and Packing	£0.80	
				Remittance enclosed	<input type="checkbox"/>

Adventure

FROM TOP TO BOTTOM

Those of you who have ventured into the dark forest of Adventure programming and typed "LOOK AROUND" probably can't see the wood for the trees by now! So let's have a look at the structure of a complete program.

From top to bottom of the program, the following sequence shows how various blocks of code fit together.

1. This block of code lays out the ground for the program to operate in:
CLEAR string space. (Allows manipulation of character strings)
DEFINE variable types. (string, integer etc.)
DIMENSION arrays.
2. This block loads the framework of the plot READ in DATA or directly assign variables — or both.
3. Start of program loop. Communicate with the player:
Check for special conditions.
Clear screen.
PRINT display variables.
Reset screen variables to null.
Await INPUT.
4. Interpret the player's communication with the computer: Decode verb and noun.
IF either are invalid singly or in combination set reply and return to block three.
ELSE GOTO block five.
5. Execute the plot:
This block comprises a number of routines, one to cover each valid verb. Each routine alters game variables and sets reply variables, then returns to block three or goes to block six, for a standard reply.
6. Set standard replies. For example "IMPOSSIBLE" "OK".
7. DATA statements to be read by block two.

Let's have a look at block one in some detail. Don't worry if your computer doesn't have all of these Basic statements — but use them if it does!

Some machines require string space to be set aside, by the use of CLEAR nnnn.

This reserves the specified amount of memory for strings and string handling. If you have this feature I suggest you start by clearing about 1500 bytes and adjust by trial and error if you start running out.

If your game is approaching the capacity of the machine, you may have to strike quite a fine balance between string space and run-time memory.

Some machines allow ranges of variables to be defined at the beginning of the program by a DEFSTR statement. DEFSTR A for example would thereafter

cause any variable whose name begins with an A to be a string variable. This saves the memory requirement for the \$ sign. Similarly, DEFINT will define a variable range as integer.

Dimensioning arrays has already been covered — but a word of advice! Make sure the plot of your game is thoroughly detailed before setting hands on the keyboard — or you will not only have to keep increasing your array dimensions, you will have to lengthen the loops that scan them — and you are BOUND to miss one! I know — I always do!

Now we can see the shape of the whole program, in the next issue I will start to examine more detailed parts of its logic.

GOING UNDERGROUND

I have been playing Abersoft Adventure supplied by Abersoft of Dyfed, which runs on a Sinclair ZX81 with 16K RAM pack.

"Welcome to Adventure" proclaims a flicker-free screen on typing "RUN", and before long we are on the edge of a forest outside a large brick building.

Further exploration leads us to a canyon, and eventually to a locked grating.

Oh dear — you didn't bring the keys, did you? Never mind — I did, so down the grating we go only to find ourselves in an underground world of caverns, low twisting passages, and a vast chamber with an uncrossable fissure.

We have collected en route a small bird, a wicker cage, and a black rod. Hang about — we've done this before haven't we?



Yes, for all intents and purposes we could be inside a Pyramid of the Tandy variety. For black rod read sceptre, for small bird read bird-stature, for wicker cage read statue box.

Those of us who are well-travelled now know how to cross the fissure, find torch batteries etc.

What I didn't mention when I received the Tandy game is that Pyramid is itself an abridged and modified version of the original Adventure.

So for sceptre read wand. Could be useful for there are things you would expect to do with a wand but not necessarily with a sceptre or rod.

Although not an original plot, it has certainly survived well! What's it like on a Sinclair? I found it — typing apart — better than on a Tandy as the screen is cleared rather than scrolled, making it, for me anyway, less confusing.

One small criticism is that the inventory is retained when the game is re-run. Consequently you can grab things, quit, and then cheat! Nevertheless, it is pleasing to see full size Adventures — in micro terms — being made available to thousands of Sinclair owners.

My thanks to Mrs. Pam Bryan of Southlands School, New Romney, for the loan of her computer for this review.

By KEITH CAMPBELL

PRACTICAL PROGRAMMING

GRAPHIC GRAPHS...

Many home computers have a sophisticated set of graphics commands, and various dialects of BASIC provide features for the format of output, including cursor control characters and such commands as PRINT USING, PRINT AT, etc. However, it is possible to do a great deal with only the standard formatting features of comma and semicolon following the PRINT statement, and the TAB function.

Using the TAB function it is possible to draw low resolution graphs; for example,:

```
100 FOR X = -1 TO 1 STEP 1/10
110 LET Y = X*X
120 PRINT TAB (Y*40); "*"
130 NEXT X
```

will give a graph of the function $Y=X^2$ from $X=-1$ to $X=1$; while

```
100 FOR X = 0 TO 2 STEP 1/10
110 LET Y = X^3
120 PRINT TAB (Y*5); "*"
130 NEXT X
```

will give a graph of the function $Y=X^3$ from $X=0$ to $X=2$.

The reason for using $Y*40$ and $Y*5$ is to provide a suitable scale for the graphs. The argument of the TAB function is required to be not greater than the number of columns on the screen; since $X^2 \leq 1$ when X is between -1 and 1 , and $X^3 \leq 8$ when X is between 0 and 2 , these values allow us to use the full width of a 40 column screen.

It is also possible to draw a graph of a function which takes negative values; for example, $Y=\sin(X)$:

```
100 LET L = 2*3.14159
110 FOR X = 0 TO L STEP 1/50
120 LET Y = SIN(X)
130 PRINT TAB (20 + 20*Y); "*"
140 NEXT X
```

Negative values will appear on the left of the screen and positive values on the right.

The most straight-forward use of the comma and semicolon in

PRINT statements is to produce columns of numbers, but there are problems when different numbers of digits are involved. For example:

```
100 FOR I = 1 TO 10
110 PRINT I; I*I; I*I*I
120 NEXT I
```

will give the result shown in table one, while replacing the semicolons with commas gives the slightly better, but still unsatisfactory table two.

We can use the TAB function to print the columns with the numbers right-justified; we need TAB(N) for one-digit numbers, TAB(N-1) for two-digit numbers, TAB(N-2) for three-digit numbers, etc. (i.e., we need TAB(N+1 - number of digits), which leaves only the problem of finding the number of digits in each number to be printed. There is no simple way to do this, but the method I prefer is the following:

```
10 LET X = number to be printed
20 LET XS = STR$(X)
30 LET D = LEN(XS)
40 PRINT TAB(N+1-D); X
```

i.e. convert the number to a string and then find the length of the string. The various operations can be combined into a single statement, PRINT TAB(N+1-LEN(STR\$(X))); X

STRINGS AND THINGS...

One point that you need to watch when using STR\$ is the format of the resulting string. Some BASICs give a leading space in a positive number while others give only the digits.

This method can be extended to deal with decimals by replacing line 20 by LET XS = STR\$(INT(X)), or in the compacted expression PRINT TAB(N+1-LEN(STR\$(INT(X)))); X. This allows you to print columns with the decimal point aligned vertically.

Another method for finding the number of digits is to use the expression $D = 1 + \text{INT}(\text{LOG}(X)/\text{LOG}(10))$. There are several

reasons why this is less satisfactory than using STR\$ and LEN, including its lack of obviousness and the practical reason that, due to rounding errors within the BASIC, it may give the wrong answer on numbers close to a power of 10.

COMPLICATED CALCULATIONS

A more complicated problem involving columns of numbers arises when we have amounts of money in pounds and pence which have to be printed with exactly two digits after the decimal point; e.g., £1.30 rather than £1.3 or £2.00 rather than £2.

If the amounts are calculated by a method which does not necessarily produce an exact number of pence the answers must first be rounded. The standard method for rounding to two decimal places is:

```
X = INT(100*X + .5)/100
(rounding to the nearest penny)
or X = INT(100*X)/100
(rounding to the lower penny)
```

When we have the answer correct to two decimal places we cannot simply print it using one of the methods above, as trailing zeroes after the decimal point will not be printed by BASIC, and the decimal point will not be printed if the answer is an integer. To get around this we have to do a great deal of manipulation, separating pounds and pence, converting to strings, removing leading spaces put in by STR\$, making sure that there is always two digits in the pence, and finally putting everything back together.

```
100 LET X = amount in pounds,
to 2 decimal places
110 REM SEPARATE X INTO L
POUNDS AND PENCE
120 LET L = INT(X)
130 LET P = 100*(X-L)
140 REM CONVERT FROM
NUMERIC TO STRING
VARIABLES
150 LET LS = STR$(L)
160 LET PS = STR$(P)
170 REM DELETE LEADING
```


PRACTICAL PROGRAMMING

```
SPACES IF NECESSARY
180 IF LEFT$(LS,1) = " "
    THEN LET LS =
    RIGHT$(LS, LEN(LS)-1)
190 IF LEFT$(PS,1) = " "
    THEN LET PS =
    RIGHT$(PS, LEN(PS)-1)
200 REM ADD LEADING ZERO
    IF LESS THAN 10 PENCE
210 IF P<10 THEN PS = "0" +
    PS
220 REM NOW BUILD UP
    FINAL STRING
230 LET AS = "£" + LS + " "
    + PS
240 REM PRINT ANSWER
    RIGHT-JUSTIFIED TO
    COLUMN N
250 PRINT
    TAB(N+1-LEN(AS)); AS
```

If you want to use the above routine in a program it can be cut down considerably by combining some of the statements, and either eliminating lines 180 and 190 or cutting them down to the part after "THEN", depending on what is required in your machine. The form given here is intended to explain the method rather than to be used as it stands.

ROUNDING ERRORS

I mentioned rounding and rounding errors above, in passing, but this is a subject that deserves a closer examination. Many of the numbers we deal with are approximate, particularly numbers obtained by measurement, and we often have to round answers to a specified number of decimal places or a specified number of significant figures.

There is a simple method for rounding to any specified number of decimal places, as described above for the case of two decimal places, and the same method can also be used to round to any required degree of accuracy.

However, when using the INT function we must always watch out for differences between the decimal number that the computer prints on the screen and the

1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
6	36	216
7	49	343
8	64	512
9	81	729
10	100	1000

1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
6	36	216
7	49	343
8	64	512
9	81	729
10	100	1000



binary number which is held internally and used in calculations. Just as some fractions do not have a decimal representation in a finite number of digits, we also find that some fractions cannot be represented in binary with a finite number of digits. Thus $1/3$ as a decimal is .3333... repeated to infinity, and as a binary fraction is .010101...

The problem with INT arises when we have a fraction that has a finite decimal representation but an infinite binary representation.

For example, $1/5$ can be exactly represented in decimal as 0.2, but in binary is .00110011... If we ask the computer to PRINT $5*(1/5)$ the answer

will come out as 1, as we expect, but internally the answer may be binary fraction .1111... to 24 or 32 places. The result of PRINT $INT(5*(1/5))$ would be 0 since the binary fraction is less than 1.

FINDING THE ANSWER...

In order to be sure that we get the right answer we must add a small fraction to the computer's answer, for example, when rounding an amount of money to the lower penny, if we use:

LET X = INT(100*X)/100

due to binary decimal conversion, $100*X$ may be 2^{-24} or 2^{-32} less than an integer and INT($100*X$) would be one less than the correct amount.

If we do the rounding by:

LET X = INT(100 X + .0001)/100

we correct for the small error

introduced by binary/decimal conversion, although adding .0001 may sometimes introduce an error in the opposite direction.

A similar problem arises when making tests for equality. As in the example above, we may find that a number printed out as an integer is actually held internally as a fraction differing by a small amount from an integer.

The test IF X = 1 THEN ... may give the wrong result although PRINT X would give the answer 1. This can be allowed for by testing for the two numbers being close together rather than for them being equal, so we should write instead IF ABS(X-1) < 1E-6 THEN...

Graphics



ADVENTURE IN VIEW

Creators of Adventure games have yet to tap the full potential of graphics.

They can be used to model terrains which could be a big advantage in such games. The terrain can provide opportunities for ambush and give a clear advantage to characters occupying the heights. In general, graphics can provide many tactical possibilities.

An important use of graphics has always been to present information in such a way that it can be easily understood.

In this article we are going to start with a table of numerical data, and examine various ways of presenting this information graphically.

Tabulated data of this kind arises in many problems and applications, and the graphical techniques that are illustrated here are widely applicable. For this reason, although a specific problem and some of the possible ways of presenting its solution are described, the ideas that are put forward should be of general interest and use.

The following table gives the heights measured at each cross-point of a rectangular grid covering a particular site.

ROW	COLUMN							
	1	2	3	4	5	6	7	8
1	1.2	1.0	0.8	0.6	0.6	0.4	0.2	0.2
2	2.1	1.8	1.5	1.6	2.2	1.9	1.0	0.8
3	2.8	2.8	2.8	3.4	4.3	3.8	2.6	2.3
4	3.3	3.5	4.2	5.8	8.2	9.2	6.3	3.4
5	3.9	4.2	4.6	5.5	5.6	5.3	4.5	4.0
6	5.1	5.3	5.9	5.7	5.8	5.5	4.9	4.6
7	6.0	6.1	6.8	6.2	6.0	5.8	5.5	5.4
8	6.1	6.2	6.4	6.6	6.2	6.2	5.7	5.6

The data could have come from an official survey or from measurements made in my garden. They could be used to model the terrain that was surveyed, but the data could equally well be used to provide the field of operations for an Adventure game.

The information in the table

can be presented in the way shown in figure one by drawing a curve using the data in each row of the table. Each curve gives a different cross-section of the surveyed region. This presentation is rather cluttered and does not really help one to visualise the appearance of the site.

Figure two shows the information presented as a contour map. This is a rather better presentation. It could be enhanced by using colours to shade the regions between contours as is done in the maps in an atlas.

However, it still does not give a visual impression of the appearance of the region. Its effectiveness depends almost entirely on whether the observer is familiar with the idea of a contour map.

A three-dimensional perspective view of the surface is given in figure three, and at last we have a visual presentation that makes it easy to interpret the data.

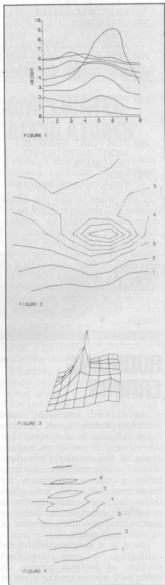
The appearance of the "wire-frame" model is improved considerably because the hidden lines are removed from the drawing.

Incidentally, you might like to determine the position of the vantage point from which the terrain is viewed in this figure.

The three-dimensional contour

map of the region shown in figure four also provides a good visual impression of the surface of the region.

An ideal presentation of the data might consist of a combination of methods. Using both a three-dimensional perspective and a contour map, the details



that are not apparent because of hidden line removal in the 3D presentation can be deduced from the contour map. Alternatively, a series of three-dimensional perspective from different viewpoints may prove to be most useful.

By Gary Marshall

EXPAND YOUR VIC



From
£85
plus VAT.

ARFON PRINTER

A low cost stand alone printer which will be almost essential for your larger programs will be launched in the Spring of 1982. The power plug for this unit is already on your expanded system.

EXPANDABLE TO 7 CARTRIDGES

You will now be able to use up to seven cartridges to expand from your basic Vic 20. These can include RAM memory expansion up to nearly 30K of usable memory, ROM cartridges with packaged programs, user expansion cartridges, printer software, disc software, RS232, IEEE interface, line expansion firmware and many others – besides of course all your games cartridges.

ARFON EXPANSION MEMORY

Immediately available from Arfon in cartridge are 3K RAM + 2 sockets, 8K RAM, 16K RAM, 8K ROM, 16K ROM. Also a basic Vic simulator cartridge to allow tape and cartridge use without altering the system.

INTERFACES

Slots have been left to allow normal use of the cassette socket, disc socket etc., which will still run normally with your expanded system.

VIC 20 Expansion System

The Arfon Vic 20 Expansion System is a finished metal cased unit that integrates your Vic 20 with an expansion board for up to seven cartridges and a toroidal power supply (fully enclosed) to give you sufficient power for any expansion and also to power the Arfon Vic Printer. Your Vic and its screen modulator are incorporated into the expansion system to produce one unit and there is an optional lid that covers the expansion area and allows your TV. to sit on top. Access to the various input sockets on your basic Vic 20 is not restricted while it is in the expansion unit.

Stocks are available now through your own Vic Dealer.

I would like to be included on your mailing list.

Name _____

Address _____

Send to:

Arfon Microelectronics Ltd.,

Cibyn Ind. Estate,

Caernarfon, Gwynedd,

N. Wales.

Arfon Micro



The name of Ragnar the pirate and his star troopers must now be feared in this sector of the galaxy. Nine enemy worlds have I plundered in the last parsec-four of these for the first time.

The invasion of Sirain's empire is going strongly. She puts up so little resistance that I will pull out half of the attacking force to plan an assault elsewhere.

My tame merchant Epplan is transferring materials as fast as his fleet can and I know he needs the business so he is no threat for the moment.

Chaos the Berserker and his many robots have proved faithful allies throughout the game ... which makes them a perfect target! And as Chaos must be thinking the same, I'll attack him now. And I wonder who ambushed those two explorer ships I sent out...?

The late night caller identifies himself: "This is Space Pirate Tharg. Unless you start delivering raw materials to me as from the next turn I'm going to plunder your home world."

He hangs up abruptly, leaving you to wonder: Can Tharg really be serious? How does he expect me to react? Was it even Tharg at all?

Hard to imagine a computer being involved in this kind of duplicity but this is an example of the kind of play you have to guard against in the still relatively undiscovered field of computer moderated gaming.

The best established of these games is Starweb, run in the U.K. by Chris Harvey, who has a host of horror stories similar to the above: of murderous berserkers claiming to be merchants to dupe the unwary; of players tricked into forfeiting their next turn; and attackers who, in mid-onslaught, realise they have been fed the wrong map information.

Anything goes and you have to be prepared to face opponents who will stop just this side of the law-of-the-land to achieve their ends. Threats, broken alliances, libel, lies and downright sneakiness, form the fabric of these games, some of which consider 18 months a good life span — others go on indefinitely.

A computer program is used to map out a world, galaxy or even universe and the rules and aims



Play-by-mail computer games are already big business in the U.S. and look ripe to take off over here. Terry Pratt reports

of its races and inhabitants. The game is then peopled by players, who take charge of tribes, nations or whole solar systems and then plan their campaigns for mastery.

Starweb, via the U.S. firm, Flying Buffalo, is a good example.

Players choose a racial type for themselves. There are six: Pirates, Berserkers, Empire Builders, Merchants, Artifact Collectors, and Apostles. Each type has his own special powers, aims and victory conditions. As he fulfills these conditions, he is awarded points.

Enough players to achieve a good game — (between 10 and 15) — strive for a points total chosen by averaging out each player's suggested winning total.

Apostles try to convert worlds, Empire Builders attempt to own worlds, Berserkers aim to destroy life, Pirates seek to plunder planets, while the popular Merchants ship much-needed raw materials and Artifact Collectors hope to gather rarities.

It's a combination of characters which ensures plenty of rivalry and conflict but also demands interaction, reliance on other players and usually results in some unholy alliances.

The player is placed on his home worlds, given ships and forces as befits his role and embarks on his quest by sending off a letter detailing his orders.

In the case of Starweb these

are sent to an old mainframe computer — a Raytheon — in America to be processed and then returned with a printout of how the universe is developing before each player's eyes. What his exploration ships have discovered and whether any contacts have been made. Turn-around is four weeks.

Other races — players — are usually contacted around turn three and then the "diplomacy" side of the game begins, with a player sending off a card to whoever ambushed his small fleet on the outer edges of his realm. This card will usually include a phone number and suggest a meeting of minds.

Swopping any information with fellow players helps to increase your understanding of the universe.

The game scores over more orthodox wargames, firstly because fellow enthusiasts are found for you and secondly, because there is a greater sense of realism. You can't see your opponent secretly massing his forces on your border and you don't know what is lurking beyond what you have explored.

You only have a player's word about his strength, race characteristics and intentions — so just how far do you trust a space pirate? According to enthusiast Kim Bailey, honesty is the best policy because those who lie are usually caught out and never trusted again.

Diploming is the most important part of the game. Being able to persuade others that it is in their interests to do what you want them to is the mark of a good player.

Occasionally you come across a player who will not talk and these, according to top player Bob Brown are the first to go: "They are an unknown quantity and that alone forces you to attack them."

It is difficult to estimate how many Starweb players there are in the U.K. as many play several games at once but it is in the region of 250+.

The U.K. end is run from P.O. Box 100, Bath Street, Walsall, West Midlands.

Starweb costs £1.50 per turn. Other Flying Buffalo games which have a following over here are: Nuclear Destruction, 50p; Battle Plan £1.00; and Space Battle, from 75p.

The only all-British game is Mike Singleton's Starlord which he wrote on his 32K Pet and began running in April 1981. It now has 300 players and allows up to 50 to compete in each game.

This game is designed to run indefinitely. Players aim to become Starlord Emperor and take their seat in the Throne Star at the centre of the Galaxy. The reward for this is free turns while Emperor, a complete printout map of the Empyr which stretches across a whole galaxy and control of any surviving Empyr garrisons.

Players start with a command ship, a base star and a fleet of 50 starships. The command ship has no fighting power but is a communications centre and the player's control is limited to seven astrals around this ship.

All the stars have a name and there are 14 types in this galaxy, including: signal stars, for galactic news; power stars, for fuel; gate and exit stars, for space jumps; city stars; battle stars and fort stars.

Battles are resolved by the computer, comparing each commander's battle orders, retreat threshold and ratio of forces on either side.

Starlord boasts a two weekly turnaround and costs £1.25 per turn. But the real measure of its success, is that America, the real

WHO'D TAKE THE WORD OF A SPACE PIRATE?



home of this form of gaming, is keen to import Starlord under licence. Mike Singleton claims proudly: "We are negotiating with three American firms. It's a bit like selling coals to Newcastle." Mike is at 1 Rake Hey Close, Moreton, Wirral, Merseyside.

Tribes of Crane is a computer assisted game with record storage and word processing performed by computer. This is set on the fantasy world of Crane and features the warring tribes of that nation.

Players take the part of a chief of one of the wandering tribes and their aim is to lead their people to dominance over the neighbouring tribes. Each tribe has its own way of measuring prosperity and so obtain points.

The game runs indefinitely and can be entered at any time and the fantasy world has a complete range of geography, ranging from desert to polar ice, with mountains, rivers and forests. Cities also form part of the world of Crane and act as centres of trade and homes for the land's powerful lords and shamans.

Among the creatures you are likely to run into are: caribou, cattle goats, warhawks and huge bipedal lizards.

The game is run in the U.K. by Mark Blundell and costs £6.50 for the first four turns. The price includes a rule book — players have to pay £1.50 per turn after that. Mark Blundell has two new games planned: Gladiator is one he wrote himself and Starmaster is a popular U.S. game. Both will be started this year. Write to him at Lothlorien, Stockdale, Healds, Bucks.

Perhaps the best recommendation for computer moderated gaming is the players themselves. The four I telephoned came from very different parts of the country but — with one exception — they all either knew or had heard of one another by reputation. A very good way of contacting fellow games enthusiasts.

● If the idea of computer moderated games appeals to you, Starweb's U.K. agent is offering the chance to play it for free through the magazine. Turn to page 15 for further details.

DOWN TO BASIC

SINCLAIR BASIC

The computer language BASIC fails to live up to its simple label in one major way. There is a variety of different versions of the language with each microcomputer manufacturer adding their own extras.

Unfortunately, this makes life difficult for the programmer transferring from one machine to another. To try and help you over this hurdle from now on, I will include a table summarising the main features of the version of BASIC available on one of the popular microcomputers. I start with the Sinclair ZX-81.

As I will continue to cover the general features of BASIC in parallel with the production of these tables, it is inevitable that they will include statements that I have not yet covered. You should use the tables for general reference.

Variables: Names of numeric variables may be of any length and consist of any combination of letters and digits provided they start with a letter. The name of a control variable in a FOR-NEXT loop must be a single letter. The name of a string variable must be a single letter followed by \$.

Arrays: The name of an array must be a single letter followed by \$ if it is a string array. Arrays may be of any size and any number of dimensions. For a string array the length of the strings must be specified in a DIM statement e.g. DIM NS(10, 5) sets up a list of 10 strings each of length 5. Substrings can be used e.g. (with above defined list) NS(2,1) refers to the 1st character in the 2nd string of list NS NS(4, 3 TO 5) refers to characters 3-5 of the 4th string.

Statements: No END statement. The form of the IF statement is <line no.> IF <condition> THEN <statement>. CLEAR, deletes all variables. CLS, clears the display. FAST, increases speed of calculation, but affects the display. PAUSE, can intro-

duce a pause in computing until a key is pressed or for a fixed time (if specified). POKE, writes specified value at specified memory address. SCROLL, scrolls the display up one line. SLOW, puts the computer in display mode.

Functions: ACS, arccosine. ASN, arc-sine. CHR\$, converts code number to character. CODE, converts character (first in specified string) to code no. number. INKEY\$, reads character pressed on keyboard. LN, natural logarithm. PEEK, value of byte in specified memory address address in range 0 to 65535. PI, value of π . STR\$, converts number to character string of digits. TAN, tangent. USR, calls machine code subroutine with specified start address. VAL, treats specified string as an arithmetic expression. Plus ABS, ATN, COS, EXP, INT, LEN, RND, SGN, SQR, SIN. Graphics: Screen has 22 rows and 32 columns. PLOT X,Y "blacks-in" screen position row X, column Y. UNPLOT X,Y "blanks" screen position row X, column Y. Graphics characters.

NOT SO SIMPLE

As the programs that you write become more complex and longer, you will face two main problems.

You will find yourself having to repeat groups of instructions at several points in your program. These groups of instructions may be identical or very similar.

Another problem is that the increase in the length of your programs makes it more difficult for you to keep track of what is going on in your program.

The unfortunate consequences of this are that you will tend to make more mistakes in developing and typing in the program, and that the errors will be more difficult to track down.

The use of **SUBROUTINES** can help alleviate both these problems.

BASIC contains the facility whereby a sequence of instructions which is to be executed at several points in a program need



only be written once. These instructions form a subroutine. Each time the subroutine is to be executed it may be entered by means of a **GOSUB** statement.

The general form of a **GOSUB** statement is

```
<statement no.> GOSUB  
<statement>
```

for example:

```
20 GOSUB 400
```

As you can see, the form of the **GOSUB** statement is very similar

to that of the **GOTO** statement. The operation of the **GOSUB** statement is in fact similar to that of the **GOTO** statement in that control will be transferred to the statement specified. In the above example, control will be transferred to statement 400.

However, with the **GOSUB** statement, a note is made of the current statement number before the specified jump takes place. It is then possible to return after the subroutine has been executed. With the **GOTO** statement, there is no record of where you jumped from.

In BASIC, a subroutine is actually no different from any other group of statements in a program except that there will be a **RETURN** statement at the end of the group. It is when this **RETURN** statement is encountered that the computer transfers to where the previous jump occurred.

The **RETURN** statement takes the form

```
<statement no.> RETURN  
for example
```

BY MOIRA NORRIE

DOWN TO BASIC

450 RETURN

After the return is made, the statement after the GOSUB statement will be executed.

Usually, subroutines are included at the end of a BASIC program. A program containing one subroutine could therefore take the general form

```
10 _____
20 _____
30 _____
40 GOSUB 400
50 _____
60 _____
70 GOSUB 400
80 _____
90 _____
100 STOP
110 REM
400 REM*****
410 REM SUBROUTINE
420 REM
430 _____
440 _____
450 RETURN
460 REM*****
470 END
```

THE NEED FOR COMMENTS...

Two main points arise from the above example.

As stated previously, the only factors that distinguish a subroutine from any other section of code is that it has a RETURN statement at the end, and it has corresponding GOSUB statements. There is nothing in the mechanism for setting them up that clearly indicates the beginning of a subroutine and the task it performs. I have emphasised

the need for comments in your program before. It is vital when using subroutines that, at the very least, you include a comment at the beginning of the subroutine.

In line 100 of the program there is a STOP statement. This causes the execution of the program to be stopped when it is reached. It is possible to have a number of STOP statements at various points in a program providing alternative stopping points.

SUBROUTINES AND LOGIC



The reason for the inclusion of a STOP statement in line 100 of the above example, is to prevent the computer automatically proceeding sequentially from statement 90 to statement 400

and through the subroutine. As a general rule, there should always be either a STOP statement or a GOTO statement immediately before a subroutine.

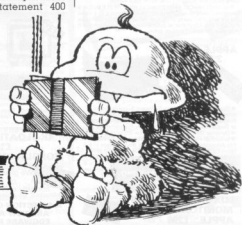
Subroutines are also used to split a program into logical sections — where each section can be developed and tested as a single unit. Ideally each logical section should be no longer than a page in length so that they remain easy to read and understand.

This may be achieved by further dividing large subroutines into logical sections some of which will themselves be subroutines. In this way, you can have nesting of subroutines.

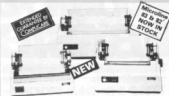
NEXT MONTH

In a program, it is often necessary to process a list of related data items e.g. a list of individual golf scores. Next month, I will show you how to set up such a list and then process it. The microcomputer system to be covered is the Commodore PET.

NEXT MONTH



NOBODY CAN GET OUR PRICES EXCEPT OUR CUSTOMERS



MICROLINE 80 £289 + VAT

• 80 cps Uni-directional • Small size: 342 (W) x 254 (D) x 108 (H) mm • 160 Characters, 96 ASCII and 64 graphics • 3 Character sizes: 40, 80 or 132 chars/line • Friction and Pin Feed • Low noise: 65 dB • Low weight: 6.5 kg

MICROLINE 82 £449 + VAT

• 80 cps Bi-directional logic seeking • Small size: 300 (W) x 226 (D) x 130 (H) mm • 160 characters, 96 ASCII and 64 graphics, with 10 National character set Variants • 3 Character sizes: 40, 80 or 132 chars/line • Built-in parallel and serial interfaces • Friction and Pin Feed • Low noise: 65dB • Low weight: 8kg

MICROLINE 83 £649 + VAT

• 120 cps Bi-directional logic seeking • 136 column printing on up to 156 lines • Small size: 512 (W) x 328 (D) x 180 (H) mm • 160 characters, 96 ASCII and 64 graphics with 10 National character set variants • 3 Character sizes: 5, 10 and 18.5 Chars/line • Built-in parallel and serial interfaces • Friction and Pin Feed • Low noise: 65dB • Low weight: 13 kg

THE ANADEX DP9500 and DP9501 A PROFESSIONAL PRINTER



• Bi-directional printing • Up to 220 chars/line • 240 x 6 print densities • 500 char buffer • RS232C and Centronics Parallel interface built-in • Full software control of matrix needles allowing graphics capability • 200 cps/sec • Fully expandable with tractor feed.

DP9500 - ONLY £845 + VAT

DP9501 - ONLY £895 + VAT

WE ARE NOW STOCKING THE APPLE II AT REDUCED PRICES



AUTOSTART EURO PLUS 48K £649 + VAT

Getting Started APPLE II is faster, smaller, and more powerful than its predecessors. And it's more fun to use too because of built-in features like:
• **BASIC** - The Language that Makes Programming Fun
• **High Resolution Graphics** (in a 54,000 Point Array) for Fully Detailed Displays
• **Sound Capability** that Brings Programs to Life
• **Wired Controls** for Games and Other Human Input Applications
• **Internal Memory Capacity** of 48K Bytes of RAM, 12K Bytes of ROM, for Big System Performance in a Small Package
• **Eight Accessory Expansion Slots** to let the System Grow With Your Needs
You don't need to be an expert to enjoy APPLE II. It is a complete, ready-to-run computer. Just connect it to a video display and start using programs for writing your own the first day. You'll find that the manual helps you make it your own personal problem solver.

APPLE DISC II 3.3 Dos



£339 + VAT
Additional Drives **£289 + VAT**

• **Powerful Disk Operating Software** Supports up to 65 drives • **Name Access** to Files for Ease of Use • **BASIC** Program Changing to Link Software Together • **Random or Sequential File Access** to Simplify Programming
• **Dynamic Disk Space Allocation** for Efficient Storage
• **Individual File Write Protection** Eliminates Accidental File Alterations • **Loads an 8K Byte Binary image** in 8.5 sec. (11.2 sec. in Pascal) • **Supports a maximum of 116 Kbytes (118K Bytes with Pascal) on Standard 5 1/4" Disks** • **Powered Directly from the APPLE II** (Up to 6 Drives) for Convenience and High Reliability • **Used in Heavy Duty, Colour Coordinated Steel Cabinet**
Colour Monitors for Apple - £295 + VAT

LUXOR 14" COLOUR MONITOR FOR THE APPLE £295 + VAT

THE EPSON MX SERIES



MX80T £339 + VAT
MX80F/T £389 + VAT

- 80/132 Column
- Centronics Parallel
- Bi-directional
- Upper & lower case
- True Descenders
- Indirect Matrix
- Condensed and Expanded Characters
- Interfaces and Ribbons available



CENTRONICS DOT MATRIX PRINTERS

737 £369 + VAT
739 £469 + VAT

- **Proportional Spacing** • **Right Margin Justification** • **3 way paper handling** • **Upper and lower case** • **True Descenders** • **Bi-directional Paper Mode** • **Underlining capability** • **Condensed/Expanded Print** • **Sub-Scripts and Super Scripts** • **Pin and Friction Feeds** • **80/132 Column**

739 as above with special feature of Dot Resolution Graphics.



NEC SPINWRITER only £1490 + VAT

NEC's high quality printer uses a print "mimble" that has less damage and inertia than a daisy wheel, giving a quieter, faster, more reliable printer that can cope with plotting and printing 128 ASCII characters with up to five copies, friction or tractor feed. The ribbon and thimble can be changed in seconds. 50 characters per second bi-directional printing - with red/black, bold, subscript, superscript, proportional spacing, tabbing, and much, much more.



HITACHI PROFESSIONAL MONITORS

9" - £129 £99.95
12" - £199 £149 + VAT

- **Reliability** Solid state circuitry using an IC and silicon transistors ensures high reliability • **500 lines horizontal resolution** Horizontal resolution in excess of 500 lines is achieved in picture center • **Stable picture** Even played back pictures of VTR can be displayed without jittering
- **Looping video input** Video input can be looped through with built-in termination switch • **External sync operation** Available as option for L and C types • **Compact construction** Two monitors are mountable side by side in a standard 19-inch rack.



ACORN ATOM UNIQUE IN CONCEPT - THE HOME COMPUTER THAT GROWS AS YOU DO

Fully Assembled £157.50 + VAT inc. PSU

- Special features include:
- Full Sized Keyboard
 - Assembler and Basic
 - Top Quality Mounted Case
 - Optional High Resolution Colour Graphics
 - 16K2 Microprocessor

4K FLOATING POINT ROOM £19.50 + VAT
COLOUR ENCODER £19.00 + VAT

We give a full one year's guarantee on all our products, which normally only carry 3 months guarantee.

A SELECTION OF APPLE INTERFACES ARE NOW AVAILABLE AT OUR EDGWARE ROAD SHOWROOM

INTRODUCING THE NEW GENIE

Ideal for small businesses, schools, colleges, homes, etc. Suitable for the experienced, inexperienced, hobbyist, teacher.



GENIE I

STILL ONLY £279 + VAT

NOW INCLUDED: Sound, Upper and lower case, Extended BASIC and Machine Code enabling the Writing and Execution of Machine Code Programming direct from Keyboard.
16K RAM 12K Microchip BASIC
Extensive Software Range: Self-Contained PSU UHF/Modulator Cassette, External Cassette Interface, Simpy plug into TV or Monitor Complete and Ready to Go. Display is 6 lines by 32 or 64 Characters Switchable. 3 Manuals included: Users Guide, Beginners Programming and BASIC Reference Manual, BASIC Program Tape Supplied. Pixel Graphics.



GENIE II

£299 + VAT

The **NEW GENIE II** an ideal Business Machine. 13K Microsoft BASIC in ROM. 71 Keyboard. Numeric Keyboard, Upper & Lower Case Standard Floating Cursor. Cassette Interface 16K RAM Expanded externally to 48K.

GENIE I & II EXPANSION UNIT WITH 32K RAM £199 + VAT

PARALLEL PRINTER INTERFACE CARD £36.95 + VAT



TEAC DISK DRIVES

- **TEAC FD-50A** has 40 tracks giving 125K Bytes unfornated single density capacity. The FD 50A can be used in double density recording mode.
- **The FD 50A is Shugart SA400 interface compatible.** Directly compatible with Tandy TR800 expansion interface.
- **Also interfaces with Video Genie, SWTP, TR80B, North Star Horizon, Superbrain, Nascom, etc.** etc.
- **Address selection for Daisy chaining up to 4 Drives.**
- **Drinks plus power supply housed in an attractive grey case.**

40 TRACK Single Disk Drive £225 + VAT
Double Disk Drive £389 + VAT

77 TRACK Single Disk Drive £299 + VAT
Double Disk Drive £499 + VAT

SALE MEMORY UPGRADES
16K (8 x 4116) £12.90 + VAT
4K Komputik (8 x 2114) £12.90 + VAT

WE HAVE ONE OF THE LARGEST COLLECTIONS OF COMPUTER BOOKS UNDER ONE ROOF, ALONG WITH SOFTWARE FOR THE GENIE, TR80B AND APPLE.

NOBODY CAN GET NEAR OUR PRICES EXCEPT OUR CUSTOMERS

IF IT WASN'T FOR THE LOWEST PRICES, THE BIGGEST CHOICE AND THE BEST AFTER SALES SERVICE, WE WOULDN'T BE COMP SHOP

NOW IN STOCK THE NEW & EXCITING TRS80 MODEL III



48K £599 + VAT

The Radio Shack TRS-80™ Model III is a ROM-based computer system consisting of:
 • A 12-inch screen to display results and other information
 • A 65 key console keyboard for inputting programs and data to the Computer
 • A 2.80 Microprocessor, the "brain" of the system
 • A Real-Time Clock
 • Read Only Memory (ROM) containing the Model III BASIC Language Fully compatible with most Model II BASIC programs
 • Random Access Memory (RAM) for storage of programs and data while the Computer is on (amount is expandable from 16K to 48K - optional extra)
 • A Cassette Interface for long-term storage of programs and data (requires a separate cassette recorder - optional extra)
 • A Printer Interface for hard copy output of programs and data (requires a separate line printer - optional extra)
 • Expansion area for upgrading to a disk-based system (optional extra)
 • Expansion area for an RS-232-C serial communications interface (optional extra)
 All these components are contained in a single moulded case, and all are powered by one power cord.

Disc Drives Kit with 2x40 Track Drives - £390 + VAT
 Disc Drives Kit with 2x80 Track Drives - £729 + VAT



SHARP PC1211
£69.95 + VAT

COMPUTER POWER THAT
 ONCE FILLED A ROOM
 CAN NOW BE CARRIED IN YOUR POCKET!

• Programs in BASIC • "QWERTY" Alphabetic Keyboard • 1.9K Random Access Memory • Long Battery Life

SHARP CE122 PRINTER & CASSETTE INTERFACE £75 + VAT CASSETTE INTERFACE ONLY £14.90 + VAT



£999 + VAT

• 4 Mhz 2 80C™ Dynamic RAM • 2K ROM • BASIC is provided • High Resolution Graphics • 9" High Focus Green Display • Upper and Lower Case • 80-40 Characters x 25 line display • Electric Magnetic Cassette Deck included • ASCII Keyboard • Numeric Keypad • Sound Output • Built-in Clock and Music.

Available Soon-Disc, Printers and other Accessories.

DO TO IMMENSE POPULARITY SALE CONTINUED

UNTIL STOCKS LAST

• 6802 based system - best value for money on the market • Powerful 8K Basic - Fastest around • Full Qwerty Keyboard • 16K RAM Expandable to 8K on board • Power supply and RF Modulator on board • No Extras needed - Plug in and go • Kansas City Tape Interface on board • Free Sampler Tape including powerful Disassembler and Monitor with each kit • If you want to learn about Micros, but didn't know which machine to buy then this is the machine for you

Build, Understand and Program your own Computer for only a small outlay.

NEW MONITOR IN ROM - available separately at £7.90 + VAT.
 Improved BASIC 3 ROM - revised GARBAGE routine allows correct use of STRING ARRAYS £4.90 + VAT
 This chip can be sold separately to existing Computik and Super board users.

FOR THE COMPUTIK - Assembler Editor £12.50 Case for UK101 £29.50
GAME PACKS - 11. Four Games £5.00 21. Four Games £5.00 Realtime Clock £3.00
 Super Space Invaders 18K £6.50 Cheques £3.00
 10 x C12 Cassettes £4.00 40 pin Expansion Jumper Cable £3.50 All Prices exclusive VAT

EUROPE'S FASTEST SELLING ONE BOARD COMPUTER COMPUKIT UK101



COMPUKIT WITH ALL THE FEATURES THAT MADE IT THE MOST PROFESSIONAL COMPUTER KIT ON THE MARKET. NOW WITH FREE NEW MONITOR (a saving), which includes Flashing Cursor, Screen Editing, & Save Data on Tape.

KIT ONLY £99.95 + VAT

Fully Assembled - £149 + VAT

PLUS £4.80 Post & Packing

UK Upgrade Kit £12.90 + VAT

YOUR ZX80 IS NOW NO LONGER REDUNDANT

Upgrade your ZX80 to the full animated graphics of the ZX81. (No screen flicker).

FOR ONLY £12.95 + VAT IN KIT FORM

Works only in conjunction with NEW 8K ROM from Sinclair (Not Included).

OUR NEW SUPER LOCATION IN IRELAND

19 Herbert Street, Dublin 2.
 Telephone: Dublin 604165

HEAR OUR ADS ON RADIO NOVA 88.1 VHF Stereo

NEW The PEDIGREE PETS

RRP £795 for 32K



32K ONLY £569 + VAT

Very popular for home & business use. 8K Microsoft Basic in ROM. 32K with new improved keyboard. 12" screen. Cassette Deck £56 extra



8032 80 COLUMB PET

ONLY £825 + VAT

The reliable value for money system with after sales support, instruction and training facilities and a wide range of programmes.

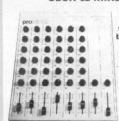
CASIO VL TONE

NEW £31.25 + VAT



It's a new kind of musical instrument. A computer controlled synthesiser that helps you create, play and arrange compositions that normally take years of musical training. Also a calculator.

SECK 62 MIXER



Professional audio mixer that you can build yourself and save over £100.

Only £99.90 plus VAT for complete kit. Plus FREE power supply valued at £25.00

COMMODORE VIC-20



ONLY £159 + VAT

• 16 foreground colours
 • 8 background colours
 • Real typewriter keyboard with full graphics
 • Music in three voices and three octaves
 • Language and sound effects

BBC COMPUTER

Please 'phone for availability and price



"Europe's Largest Discount Personal Computer Stores"

Delivery is added at cost. Please make cheques and postal orders payable to **COMP SHOP LTD.**, or phone your order quoting **BARCLAYCARD, ACCESS, DINERS CLUB or AMERICAN EXPRESS** number.

MAIL ORDER AND SHOP

CREDIT FACILITIES ARRANGED - send S.A.E. for application form.
 14 Station Road, New Barnet, Hertfordshire, EN5 1QW (Close to New Barnet BR Station - Moorgate Line).
 Telephone: 01-441 2922 (Sales) 01-449 6596 Telex: 298755 TELCOM G

OPEN (BARNET) - 10am - 7pm - Monday to Saturday

NEW WEST END SHOWROOM:

311 Edgware Road, London W2 Telephone: 01-262 0387
 OPEN (LONDON) - 10am - 6pm - Monday to Saturday

• IRELAND: 19 Herbert Street, Dublin 2, Telephone Dublin 604165
 • COMP SHOP USA, 1348 East Edinger, Santa Ana, California, Zip Code 92705.
 Telephone: 0101 714 9472526



Kit K'n'et

SCREWDRIVERS AND SPANNERS

It would be nice, I keep telling myself, if I could carry on me every single piece of electronic equipment I was ever going to need. I tried once but my pockets split. Now all I carry around is a small neon screwdriver and a penknife, with which I can get most pieces of domestic equipment installed or temporarily repaired.

Of course, for construction, as well as for the majority of repair jobs you will need quite a few more pieces of equipment — and these I will cover here.

Before I start there are a number of important points to remember. The first, which is a rule of thumb I always employ, is to buy the best you can afford. Secondly, and almost as important, don't waste money buying something you will not use or which you could do without.

The last point is to find out which model is right for you by reading through the catalogues and trying out the equipment in the shops. This especially applies to soldering irons.

Now, down to the tools. I will start, as I have just mentioned them, with soldering irons. There are two main types — uncontrolled mains heated and temperature controlled, either mains or low voltage AC or DC.

Whichever one you get you will be able to undertake the same work. Buy an iron with interchangeable bits, and get a spare one to go with it. You should have one small — one to 2mm — and one medium — 2 to 4mm.

The names to look out for are: Adcola, Antex, Erasa, Oryx, and Weller for mains uncontrolled and add Ungar to the list for controlled irons. Prices range from £4.50 to £8.00 for mains and from £12 to £40 for controlled. An iron should last a lifetime, only the bits need be changed.

You can't really go wrong with solder, but having said that do not buy acid flux type. Use 60/40, tin/lead in 22swg, which is generally available. To unsolder use desoldering braid. It is easier



and cheaper than a solder sucker. I have found Multicore Solder Wick to be the best although there are other makers such as Spig and WIK-IT. The worst, without a doubt, is the one made by RS Components.

Next on the list are pliers and cutters. These can be bought separately or as a set. Either way will do. Find the ones which suit you best by trying them out.

The pliers should be pointed nose with either plain or serrated jaws. The cutters ought to be lightweight, either side or diagonal cutting for the best results. Manufacturers include Arhoso, Barco, CK, EPE Corporation, Erim, Lindstrom Proto, Wilkinson and Xcelite. The prices range from £5 to £8 for pliers and from £4 to £15 for cutters.

For cutting heavier gauge wire and pins I suggest a purpose built cutter and stripper as the light cutters can easily be damaged on the harder materials. Prices range from £1.50 to £5.00 and most are usually good value, and most of the makers of pliers and cutters produce these.

It is most important to buy the best when it comes to screwdrivers. Sets are too expensive and usually contain too many sizes. Changeable blades are a waste of time in my opinion, if you are using different heads and screw sizes. For slotted screws you will only need four sizes at the 3, 4, 5, 6.5mm marks. All should have 8-12cm long blades.

When it comes to the cross-heads it is important to match the head with the driver. There are two main types — Phillips and Pozidriv. Pozidriv now have Supadriv, but the difference is only cosmetic. If you use screws in your work please make sure that they are Pozidriv, as they are much more reliable than Phillips. Two sizes will do for each type and it is best to make the smaller ones nice and small to fit the recessed screws. There are too many names to mention so shop around. Individual prices below £1 are good value.

Allen keys, which are really hexagonal keys, are also very handy and come in very reasonably priced sets. It is worthwhile getting both Imperial and Metric.

Small spanners are very useful for tightening up nuts as the use of pliers is not to be encouraged. Again, there is no standard and in fact this time there is a choice of three: Imperial, American and Metric.

The common Imperial sizes are 4 and 6BA, 2 and 8BA only occasionally being used. The American sizes are $\frac{3}{16}$ "AF, $\frac{1}{4}$ "AF and $\frac{5}{16}$ "AF. All are commonly used. The Metric nuts come in M2.5, M3, M4, and M5. Again the middle two are most common. The safest method of purchase is to get an adjustable spanner.

There are several types of spanner, the most common being the open ended. Nut drivers are handy but pricey, as are ring spanners. However, do not make do with the wrong sizes. As with crosshead screws you will only damage both tool and component. Some spanner makers are: Bedford, Bahco, Eclipse, Elora, Footprint, and King Dick. Prices extend over a great range, from 50p to £3 for nut drivers and shifting spanners. Value for money comes at about midrange.

If you are going to expand your construction projects you will undoubtedly need a comprehensive set of tools.

BY KEITH MOTT

Make the most of your Sinclair ZX Computer...

Sinclair ZX software on cassette.

£3.⁹⁵ per cassette.

The unprecedented popularity of the ZX Series of Sinclair Personal Computers has generated a large volume of programs written by users.

Sinclair has undertaken to publish the most elegant of these on pre-recorded cassettes. Each program is carefully vetted for interest and quality, and then grouped with other programs to form a single-subject cassette.

Each cassette costs £3.95 (including VAT and p&p) and comes complete with full instructions.

Although primarily designed for the Sinclair ZX81, many of the cassettes are suitable for running on a Sinclair ZX80—if fitted with a replacement 8K BASIC ROM.

Some of the more elaborate programs can be run only on a Sinclair ZX Personal Computer augmented by a 16K-byte add-on RAM pack.

This RAM pack and the replacement ROM are described below. And the description of each cassette makes it clear what hardware is required.

8K BASIC ROM

The 8K BASIC ROM used in the ZX81 is available to ZX80 owners as a drop-in replacement chip. With the exception of animated graphics, all the advanced features of the ZX81 are now available on a ZX80—including the ability to run much of the Sinclair ZX Software.

The ROM chip comes with a new keyboard template, which can be overlaid on the existing keyboard in minutes, and a new operating manual.

16K-BYTE RAM pack

The 16K-byte RAM pack provides 16-times more memory in one complete module. Compatible with the ZX81 and the ZX80, it can be used for program storage or as a database.

The RAM pack simply plugs into the existing expansion port on the rear of a Sinclair ZX Personal Computer.



Cassette 1—Games

For ZX81 (and ZX80 with 8K BASIC ROM)

ORBIT—your space craft's mission is to pick up a very valuable cargo that's in orbit around a star.

SNIPER—you're surrounded by 40 of the enemy. How quickly can you spot and shoot them when they appear?

METEORS—your starship is cruising through space when you meet a meteor storm. How long can you dodge the deadly danger?

LIFE—J.H. Conway's 'Game of Life' has achieved tremendous popularity in the computing world. Study the life, death and evolution patterns of cells.

WOLFPACK—your naval destroyer is on a submarine hunt. The depth charges are armed, but must be fired with precision.

GOLF—what's your handicap? It's a tricky course but you control the strength of your shots.

Cassette 2—Junior

Education: 7-11-year-olds

For ZX81 with 16K RAM pack
CRASH—simple addition—with the added attraction of a car crash if you get it wrong.

MULTIPLY—long multiplication with five levels of difficulty. If the answer's wrong—the solution is explained.

TRAIN—multiplication tests against the computer. The winner's train reaches the station first.

FRACTIONS—fractions explained at three levels of difficulty. A ten-question test completes the program.

ADDSUB—addition and subtraction with three levels of difficulty. Again, wrong answers are followed by an explanation.

DIVISION—with five levels of difficulty. Mistakes are explained graphically, and a running score is displayed.

SPELLING—up to 500 words over five levels of difficulty. You can even change the words yourself.

Cassette 3—Business and Household

For ZX81 (and ZX80 with 8K BASIC ROM) with 16K RAM pack

TELEPHONE—set up your own computerised telephone directory and address book. Changes, additions and deletions of up to 50 entries are easy.

NOTE PAD—a powerful, easy-to-run system for storing and

retrieving everyday information. Use it as a diary, a catalogue, a reminder system, or a directory.

BANK ACCOUNT—a sophisticated financial recording system with comprehensive documentation. Use it at home to keep track of where the money goes, and at work for expenses, departmental budgets, etc.

Cassette 4—Games

For ZX81 (and ZX80 with 8K BASIC ROM) and 16K RAM pack

LUNAR LANDING—bring the lunar module down from orbit to a soft landing. You control attitude and orbital direction—but watch the fuel gauge! The screen displays your flight status—digitally and graphically.

TWENTYONE—a dice version of Blackjack.

COMBAT—you're on a suicide space mission. You have only 12 missiles but the aliens have unlimited strength. Can you take 12 of them with you?

SUBSTRIKE—on patrol, your frigate detects a pack of 10 enemy subs. Can you depth-charge them before they torpedo you?

CODEBREAKER—the computer thinks of a 4-digit number which you have to guess in up to 10 tries. The logical approach is best!

MAYDAY—in answer to a distress call, you've narrowed down the search area to 343 cubic kilometers of deep space. Can you find the astronaut before his life-support system fails in 10 hours time?

Cassette 5—Junior Education: 9-11-year-olds

For ZX81 (and ZX80 with 8K BASIC ROM)

MATHS—tests arithmetic with three levels of difficulty, and gives your score out of 10.

BALANCE—tests understanding of levers/fulcrum theory with a series of graphic examples.

VOLUMES—'yes' or 'no' answers from the computer to a series of cube volume calculations.

AVERAGES—what's the average height of your class? The average shoe size of your family? The average pocket money of your friends? The computer plots a bar chart, and distinguishes MEAN from MEDIAN.

BASES—convert from decimal (base 10) to other bases of your choice in the range 2 to 9.

TEMP—Volumes, temperatures—and their combinations.

How to order

Simply use the order form below, and either enclose a cheque or give us the number of your Access, Barclaycard or Trustcard account. Please allow 28 days for delivery. 14-day money-back option.

sinclair **ZX SOFTWARE**

Sinclair Research Ltd,
6 Kings Parade, Cambridge,
Cambs., CB2 1SN. Tel: 0276 66104.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3HR. Please print
Please send me the items I have indicated below.

Qty	Code	Item	Item price	Total
	21	Cassette 1—Games	£3.95	
	22	Cassette 2—Junior Education	£3.95	
	23	Cassette 3—Business and Household	£3.95	
	24	Cassette 4—Games	£3.95	
	25	Cassette 5—Junior Education	£3.95	
	17	*8K BASIC ROM for ZX80	£19.95	
	18	*16K RAM pack for ZX81 and ZX80	£49.95	
		*Post and packing (if applicable)	£2.95	
		Total £		

*Please add £2.95 to total order value **only** if ordering ROM and/or RAM.

I enclose a cheque/PO to Sinclair Research Ltd for £
Please charge my Access/*Barclaycard/Trustcard no.

*Please delete as applicable.

Name: Mr/Mrs/Miss
Address: _____

CVG05

Sinclair ZX81 Personal Computer the heart of a system that grows with you.

1980 saw a genuine breakthrough – the Sinclair ZX80, world's first complete personal computer for under £100. Not surprisingly, over 50,000 were sold.

In March 1981, the Sinclair lead increased dramatically. For just £69.95 the Sinclair ZX81 offers even more advanced facilities at an even lower price. Initially, even we were surprised by the demand – over 50,000 in the first 3 months!

Today, the Sinclair ZX81 is the heart of a computer system. You can add 16-times more memory with the ZX RAM pack. The ZX Printer offers an unbeatable combination of performance and price. And the ZX Software library is growing every day.

Lower price: higher capability

With the ZX81, it's still very simple to teach yourself computing, but the ZX81 packs even greater working capability than the ZX80.

It uses the same micro-processor, but incorporates a new, more powerful 8K BASIC ROM – the 'trained intelligence' of the computer. This chip works in decimals, handles logs and trig, allows you to plot graphs, and builds up animated displays.

And the ZX81 incorporates other operation refinements – the facility to load and save named programs on cassette, for example, and to drive the new ZX Printer.



New BASIC manual

Every ZX81 comes with a comprehensive, specially-written manual – a complete course in BASIC programming, from first principles to complex programs.

Kit: £49.⁹⁵

Higher specification, lower price – how's it done?

Quite simply, by design. The ZX80 reduced the chips in a working computer from 40 or so, to 21. The ZX81 reduces the 21 to 4!

The secret lies in a totally new master chip. Designed by Sinclair and custom-built in Britain, this unique chip replaces 18 chips from the ZX80!

New, improved specification

- Z80A micro-processor – new faster version of the famous Z80 chip, widely recognised as the best ever made.
- Unique 'one-touch' key word entry: the ZX81 eliminates a great deal of tiresome typing. Key words (RUN, LIST, PRINT, etc.) have their own single-key entry.
- Unique syntax-check and report codes identify programming errors immediately.
- Full range of mathematical and scientific functions accurate to eight decimal places.
- Graph-drawing and animated-display facilities.
- Multi-dimensional string and numerical arrays.
- Up to 26 FOR/NEXT loops.
- Randomise function – useful for games as well as serious applications.
- Cassette LOAD and SAVE with named programs.
- 1K-byte RAM expandable to 16K bytes with Sinclair RAM pack.
- Able to drive the new Sinclair printer.
- Advanced 4-chip design: micro-processor, ROM, RAM, plus master chip – unique, custom-built chip replacing 18 ZX80 chips.



Built: £69.⁹⁵

Kit or built – it's up to you!

You'll be surprised how easy the ZX81 kit is to build: just four chips to assemble (plus, of course the other discrete components) – a few hours' work with a fine-tipped soldering iron. And you may already have a suitable mains adaptor – 600 mA at 9V DC nominal unregulated (supplied with built version).

Kit and built versions come complete with all leads to connect to your TV (colour or black and white) and cassette recorder.



Computer-



16K-byte RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16!

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of competitive additional memory.

With the RAM pack, you can also run some of the more sophisticated ZX Software – the Business & Household management systems for example.

Available now- the ZX Printer for only £49.⁹⁵

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alpha-numerics and highly sophisticated graphics.

A special feature is COPY, which prints out exactly what is on the whole TV screen without the need for further instructions.

At last you can have a hard copy of your program listings – particularly useful when writing or editing programs.

And of course you can print out your results for permanent records or sending to a friend.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your computer – using a stackable connector so you can plug in a RAM pack as well. A roll of paper (65 ft long x 4 in wide) is supplied, along with full instructions.

How to order your ZX81

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp-needed coupon below. You can pay

by cheque, postal order, Access, Barclaycard or Trustcard. EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.

Qty	Item	Code	Item price £	Total £
	Sinclair ZX81 Personal Computer kit(s). Price includes ZX81 BASIC manual, excludes mains adaptor.	12	49.95	
	Ready-assembled Sinclair ZX81 Personal Computer(s). Price includes ZX81 BASIC manual and mains adaptor.	11	69.95	
	Mains Adaptor(s) (700 mA at 9V DC nominal unregulated).	10	8.95	
	16K-BYTE RAM pack.	16	29.95	
	Sinclair ZX Printer.	27	59.95	
	8K BASIC ROM to fit ZX80.	17	19.95	
	Post and Packing.			2.95

☐ Please tick if you require a VAT receipt

TOTAL £

*I enclose a cheque/postal order payable to Sinclair Research Ltd, for £

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable.

Please print.

Name: Mr/Mrs/Miss

Address:

FREEPOST – no stamp needed.

CVG05

sinclair ZX81

6 Kings Parade, Cambridge, Cambs., CB2 1SN.
Tel: (0276) 66104 & 21282.



CONTROL TECHNOLOGY ZX81 16k SOFTWARE

PACK 10 includes all of:
AIR TRAFFIC CONTROL: Animated radar screen on home
report display, you must direct planes on time.
BROOKSIDE SELF PLAY: PIONEER - lamp hands
and realistic numbers on console. **£4.95**
Computer drawing program. Who will you pick for?
All only **£4.95**

PACK 10 includes all of:
ADVENTURE ATLANTIC: You may become any rich or
poor as the legendary hero. BROADBENT: SOLID
PRACTICE: LANGUAGE TRANSLATOR: Whatever any
European language to any other. COMPCHESS: -
Use this program to predict results of horse races.
Football, polo, etc.
All only **£4.95**

PACK 10 includes all of:
100 100: video readout: DRAUGHTS: Computer
Chess: BATTLEZONE: - realistic warfare on your
own computer.
BATTLEZONE: - Brain Teaser, see if you can beat a
microcomputer maze.
All only **£4.95**

The breakthrough you've waited for
PROGRAM THE Z81 IN ENGLISH!
With GAMAL. If you can now save adventure programs
in hex not mazes and even GAMAL. If you'll have
every adventure you'll ever want for the price of one.
Comes on cassette with instruction book. **£7.95**

All our software comes with full instructions and is **SAVED** and ready to **RUN**,
no need to spend hours laboriously typing in from books.

CONTROL TECHNOLOGY — PERSONAL COMPUTER SCIENCE

Cassette 15

A super value cassette of 15k and 10 software written in
Machine Code and Basic.
Includes:
Pac-Man, Shogun, Russian Attack, Most of Death,
Panicstrider, 100,000,000,000,000,000,000,000,000,
Lamp Hands, etc.
All only **£5.95**

Tapetack 50, Version 3

10 programs for the ROMAN Z81.
Laser version includes:
SOLID, BROADBENT, COLUMBIA, SPAT,
INTERVIEW, CREDIT CARD CALCULATOR, BARR,
A.C. VORCEK, TANK BATTLE, TOPPER,
NEWGARD, BINARY CORNER, AND LOTUS, LOTUS,
MORE
Get amazing value at **£5.95** the lot

ZX-81

PACK 10/1 + 10/2 + 10/3
Large text only **£5.95**
ALL THREE ONLY
£5.95

TAPEBOOK 50.3 + CASSETTE 15/3
BOTH ONLY
£5.95

CONTROL TECHNOLOGY

GEE CROSS, HYDE, CHESHIRE, SK14 5JG
061-368 7508

39 GLOUCESTER ROAD, GEE CROSS, HYDE, CHESHIRE, SK14 5JG



Ctech Software Simply Megabytes Ahead!

ATM

DEFENDER. You defend the planet against UFO's, fast
moving, Hives Graphics, Sound effects, Thrust, Laser Torpedos,
climb, descend, superbly detailed **G4 + T5 £4.00**

ASTRO BATTLEZONE. fastened in the cockpit of your
starfighter, you view the 3D graphics of the earth revolving
silently below, starting from your head up display you suddenly
glimpse the enemy hurtling towards you, you turn at them, the
hologram rolls over, the engines roar as you climb to the
stars **G4 + T5 £5.00**

FRUIT MACHINE. Our version has HIFEGraphics, nudge,
collect, respin, gamble and even plays "Oranges
and Lemons" when you win **G3 + T5 £4.00**

POLECAT. Countrywide Packman, you must move your Rabbit
through the underground maze, but you are being chased by a
polecat so you must run like a rabbit until you've collected all your
your carrots growing on the top of the Burrow. **G4 + T5 £5.00**

MINEMINE. You must steer your way through a perilous
minefield without exploding any mines, blasting mines can
cause chain reactions. **G0 + T5 £5.00**

EARLY WARNING. Atomic Missile Command, destroy the
incoming ICBMs using a realistic radar screen and intercept
missiles. **G4 + T5 £5.00**

N.B. G = GRAPHICS T = TEXT

ANY 3 ONLY £9.00

Control Technology, 39 Gloucester Rd,
Gee Cross, Hyde, Cheshire SK14 5JG.

All prices include VAT, P&P.

MICROAGE ELECTRONICS LONDON'S BIGGEST ACORN STOCKIST



OFFICIAL
BBC
STOCKIST

ATOM KITS

In our books the best computer
kit available. Build yourself
an Acorn Atom for **only £135**,
plus £2.50 p+p

ATOM SOFTWARE

Games Packs 1-8, Database,
FORTH, Atomcalc, everything in
stock. 30p p+p

BBC ROM

Update your Atom to the BBC
operating system.

Atom Discpack. £345

5 1/4 discpack only £345, operating
manual, cables, plus £2.50 p+p

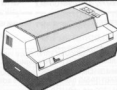
DAI Personal Computer. £684

48K RAM 24K ROM

The BBC Cassette Recorder £24

As chosen by the BBC, but
cheaper! £2.50 p+p
If it's not in the advertisement,
send for our mail order lists.

ORDERS TAKEN NOW FOR BBC MACHINE



THE GP - 80A dot matrix printer,
LOWEST EVER PRICE
ONLY £199 £4.50 p+p
Dot Matrix, Full 96 ASC11
character

ZX81 Owners £20 off

Bring us your working ZX80 or 81
and get £20 off any Atom —
kit or built.

**ALL PRICES INCLUDE VAT
ABSOLUTELY NO MORE TO PAY.
SEE US AT COMPUTER FAIR 23-25 APRIL**



FROM THIS — TO THIS AT THE FLICK OF A SWITCH

With the new ZENITH Monitor. Choose between small or large format
depending on what you're doing. Small format for definition,
large format for display. Full 12" GREEN screen. Only £85 while
stocks last. It doesn't change the output from your computer, just
changes the size of the display. Ideal for VIC 20, TRS 80, Atom, BBC,
+ Genie machines. £4.50 p+p



Blank
Cassettes
40p each,
£3.50
for 10,
70p p+p

Also available:
2114 IC's, Paper for most
printers, Enormous selection of
Books, Leads, etc, etc, etc.

RACOMM COLOUR MONITOR

Absolute high resolution. 700x300
pixels 12" £350 + £5 p+p Atom,
BBC, & Genie machines.

ATARI VIDEO SYSTEM GAMES

Warlords **£19.95**
Missile Command **£22.50**
plus many, many more
ACTIVISION GAMES
Skiing **£18.95**
Kaboom! **£18.95**
plus many, many more
30p p+p

MICROAGE ELECTRONICS
135 HALE LANE EDGWARE MIDDLESEX HA8 9QP
TEL: 01-959 7119 TELEX 881 3241

Brainwave

MIND ROUTINES

QUESTION 1

Find the first prime number greater than 5000 which is the sum of two other prime numbers.

QUESTION 2

Find a prime number such that the sum of the prime number itself and its next two consecutive numbers is also a prime number greater than 5000.

QUESTION 3

Find three prime numbers all different which add up to 5001 such that their product is maximised.

● The winners of our March Brainware problems are Stan Cartwright of Maelog Place, Gabalfa in Cardiff who was first out of the hat with a correct crossword entry, and Andrew Chandler of Downland Close, Botley, Southampton, who was first out of the hat in the Mind Routines puzzle.

Bottles of champagne are on their way to both.

More bottles can be won for the first two correct entries out of the hat for this month's problems.

Send them to: Computer & Video Games, Durrant House, 8 Herbal Hill, London EC1R 5JB. The closing date is 13 May.

NEVERA

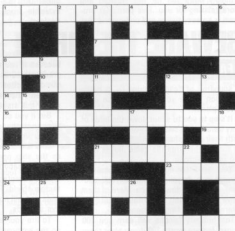
CROSSWORD

ACROSS

- In which to write bridge program (5, 8).
- Creature created from an article on party eleven (8).
- A beginner in the race ends the pinball game (4).
- Souped up pretender (6).
- Type of operation requiring lots of poetry (4).
- Abbreviated divinity in the middle of the grid (2).
- Space game where tracks are a lot misplaced (5, 8).
- Greek cat noise (2).
- Keep the program from the U.S.A. very carefully (4).
- Tiny measurement of computer direction. Denoted by 19 across (6).
- Get rid of southern basic retrieve command (4).
- Asteroid battleground of endless unix poem (8).
- Program explanation paper at a charge (13).

DOWN

- Truth alternatives as are 3 and 4 of 12 (7).
- Paper's speed string storage (9).
- Record function (3).
- White collar union in nominal goto (5).
- Valid centre fighter (3).
- RND machine man (5).
- Initially the line printer disc (2).
- Silicon Valley country (3).
- Software company pets frequently (9).
- Judge side emulation piece (4).
- One on an island (4).
- Clock on to the first part of this popular game (3).
- Tired program execution feathers (7).
- Fathom the micro's audio output (5).
- Dotty code (5).
- Absense not without end (2).
- Company in new computer beginnings (3).
- Take a byte? (3).



SUPERMARKET

CARNELL SOFTWARE ZX-81 16K SOFTWARE

CZ: £450 VOLCANIC DUNGEON

You are the Hero-Heroine, in a fantasy world of myth and magic. You must try and rescue the Elks Princess, imprisoned in a crystal coffin, deep within the Volcanic Dungeon. Monsters, pits, firey caverns and collapsing bridges make your task far from easy. Demolishing strength and water supplies add to the problems. Single key entry cuts out tedious typing. Map of Dungeon included.

HANGMAN

A defence version of the classic game, in two degrees of difficulty. Features include, computer-opponent word choice, gradual build up of hanging man etc.

NEW ... NEW ... NEW

We are launching two exciting adventures at the 3rd ZX Monthly. See us there at Central Hall, Westminster on 30 April - 1 May or send large S.A.S. for list.

Make Cheques/P.O. payable to R. CARNELL. ALL ORDERS PLUS 40p P.P. to: CARNELL SOFTWARE, 4 STAUNTON RD., SLOUGH, BERKS. SL2 1HT.

ZX 81 (16K) EDUCATIONAL SOFTWARE

G.C.E. "O" Level Maths (13-16 years)

Junior English (8-13 years)

Junior Maths (8-13 years)

Champions Quiz (for all the family)

£4.50 per cassette or send S.A.E. for catalogue to: ROSE CASSETTES, 148 WINDY Lane, Solihull, West Midlands, B91 3LH.

NEW — VIC VEX

The frustrating graphic game of lost opportunity for the 3.5K Vic. Can you move up the corridors of power. Introductory price £7.00 inc. (Up to 31st May)

From: MR MICRO LTD, PO Box 24, Swinton, Manchester, M27 3AL.

BBC MICRO GAMES

AVAILABLE NOW: Three superb games cassettes demonstrating the fantastic sound and graphics of the BBC micro (Models A and B).

CASSETTE ONE: (1) STAR TREK — the classic game (2) CANDY FLOSS — a tremendous new game. Try your hand at selling candy floss on Blackpool beach. Only £5.95 incl.

CASSETTE TWO: Hangman, Cryptogram, Disc, Beetle, Grand National and Music Only £3.95 incl.

CASSETTE THREE: For the arcade fanatics, MUTANT INVASION. A brilliant new "Space Invaders" type game. WARNING — VERY ADDICTIVE! Only £5.95 incl.

Deduct £1.00 for 2 cassettes, £2.00 for 3 cassettes. Send cheques/P.O.s to: SINCLAIR, DEPT CVD, 95 FITZROY ROAD, BISHAM, BLACKPOOL, LANC.

ZX80 — ZX 81 HARDWARE

Tape recorder interface unit. Designed to help those with LOADING difficulties. Self contained at £12.50 inc.

Video amp. unit to allow ZX80/81 to drive standard video monitor. Much better pictures than on the T.V.'s. Self contained at £12.50 inc.

SAE for details

D. BRUCE ELECTRONICS
THE BEACON
BLACKHALL ROCKS
CLEVELAND TS27 4RH
TEL. 0783 863612

ZX81 GAMES

HIGH QUALITY,
LOW COST SOFTWARE
(ABSOLUTELY NO RUBBISH)

GAMESTAPE 1, for 1K, only £3.95

10 Games incl. Asteroids, UFO, etc

GAMESTAPE 2, for 16K, only £4.95

Starfighter, Pyramid, Artist.

GAMESTAPE 3, for 16K, only £5.95

Catacombs... A Graphics

Adventure.

GAMESTAPE 4, for 16K, only £5.95

3D Monster Maze... Unbelievable

Graphics.

Cheque/P.O.s to

J.K. GREY SOFTWARE, Dept CVG,

16 PARK ST., BATH, AVON BA1 2TE.

ACORN ATOM SOFTWARE

PUCKMAN £5

12K RAM THE WORLD'S MOST POPULAR
ARCADE GAMES COMBLED UP THE DOTS IN
THE PUCK BUT AVOID THE GHOSTS, EAT A STAR, THE
CHASE REVERSES GRAPHICS MOVE GREAT FUN!

MISSILE COMMAND £5

15100 THE ATOM RAM-BOR 2K RAM COLOUR
GRAPHICS MOVE 3D IN THE ARCADE GAME PROTECT YOUR
CITIES FROM THE ALIEN CRAFTSMAN.

BOTH GAMES HAVE EXCELLENT GRAPHICS & SOUND

PRICES INC P+P MICROMANIA

14 LOWER HILL RD. EPSOM, SURREY.

THE GREAT BALLOON RACE — THE VIC GRAPHIC ARCADE GAME

Current high score: 86. (Yes, 86) by
John Kay of Urmston. Surely you can
beat that! And win the growing kitty!
Cassette and 3 chances to enter for
£16.00 inc. From: **MR MICRO LTD, PO**
Box 24, Swinton, Manchester, M27 3AL.

VIC 20 SOFTWARE

Five great games on one cassette for only
£4.95

*Life, Explosion; 3D XEOSY; Pontoon; King
(*mic code)

All run on any size of VIC.

Cheques to: **BIG SOFTIE, 5 Ashton Park,**
Belfast, BT10 0JQ.

BUFFER MICRO SHOP

(NEXT TO STREATHAM STATION)

NEW RETAIL CENTRE FOR

*** ZX 81 ***

SOFTWARE, GAMES,

RAM-PACKS, KEYBOARDS

Items from most leading mail order sup-
pliers — games, serious, business and
technical progs — available over the
counter, see appreciated for catalogue.

**374A STREATHAM HIGH ROAD,
LONDON SW16
TEL. 01-769 2887**

FTWARE SOFTWARE SOFTWARE SOT PREVIEWS

THE APPLE COMES UP TRUMPS

GERMAN WHIST

Keeping the kids amused with a computer
is easy, but you end up with rather anti-
social kids.

This program is the answer. German
Whist is a fun card game, ideal for teaching
children the rudiments of trick-taking,
trumps, and all the other things they will
need for playing Bridge when they enter
High Society.

Getting your Apple to do the teaching is
probably more fun for the children and
more relaxing for you. This particular pro-
gram is so easy to use and understand that

it could also be a useful introduction to
using the computer.

The screen displays your hand of 13
cards, in good graphics, plus an indicator
showing trumps, and the top card of the
remaining pack.

The Apple's hand is not visible. To play a
card from your hand you simply turn the
game paddles until a large flashing
rectangle is over the desired card, then
press the button.

The standard of play is quite good and
the game is fast enough to be interesting.
The program keeps a running total of
games won and lost.

All told, an amusing little program with-
out the stress building tension of the usual
computer games.

German Whist runs on a 48K Apple
under DOS 3.2 or 3.3, costs £9.95 and is
available from principal Apple software
dealers.

BEWARE THE BIRDS!

FALCONS

A squadron of deadly falcons fly in battle
formation above your defence base on a
lonely planet.

It's up to you to shoot down the birds of
prey before they swoop down and grab you
with their razor-sharp claws. If you manage
to survive the birds the game moves onto
the second phase.

This time the falcons appear on the
screen in a diagonal formation, still sud-
denly swooping down at you. More of them
move out of their formation to take up
alternative attacking positions.

The ordinary falcons will earn you 100
points, but are worth 300 if you blast them
as they swoop at you.

Beware of the falcons which reach your
base level. They walk along the bottom of
the screen.

Into the third phase your life gets really
dangerous. The falcons have laid eggs, and
these tiny blue dots invade the screen
snaking their way towards you, all the time
getting bigger and bigger.

It's vital to shoot them down while they
are in their early stage of development

because if you don't they grow into huge
green creatures capable of the most hor-
rific destruction. They are worth 200 points.

When I played it, I was unable to come
out of this stage of the game alive.

But if you do manage it the fourth stage
brings a mother ship on to the screen which
can be worth up to 9000 points.

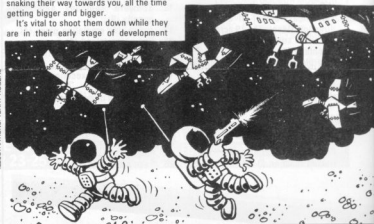
This is the most hazardous phase of all
as the ship opens up a hatch and drops
scores of baby falcons on to your ship.

One advantage the player has is a pro-
tective shield. This only lasts for four sec-
onds and will not operate again for another
five seconds.

To fire your laser beam press the 0 key
on the keyboard, the 1 key to activate the
protective shield. A joystick or the arrow
keys are used to move your base ship.

This is one of the latest offerings from
Richmond based SBD Software who
specialise in Apple games imported from
the States. Falcons costs £18 and is for an
Apple II with 48K memory.

ILLUSTRATIONS: TERRY ROGERS



UNDERGROUND HAUNT FOR MONSTERS

Prowling around the Catacombs in search of gold you suddenly come across an evil looking monster — will you get the gold before the monster gets you?

The aim of Catacombs is to find as much gold as possible before you run out of food or are caught by one of a variety of creatures. It runs on a ZX81 in 16K.

Keys 1 to 8 move you in the direction indicated on the keys — 1 to 4 move you diagonally. Keys 5 to 8 with shift enable you to tunnel, but beware, this uses up a lot of your food. As you move a series of rooms and passages will unfold, these may contain food. As you move a series of rooms and passages will unfold, these may contain food, gold, monsters or nothing at all.

There is always an exit to be found on each level if things get tough. The exit takes you to a different level, which provides a breathing space while the ZX sets this up.



When meeting a monster you can run away, but it will follow.

An excellent addictive game which will keep you amused for hours. For £4.95 it is certainly worth adding to your collection, but be prepared for a struggle when loading — certainly the most troublesome that I have encountered. Catacombs comes from J. K. Greve Software.

MISSILES MISS TARGET

Man the Bunkers! Take cover! It's the four minute warning! Which is about the length of time one needs to get used to working the controls in this game of Missile Attack.

This game is a very fast machine-code program of the well-known arcade game *Missile Command*.

The object is to protect your cities and missile bases from the onslaught of countless enemy missiles. This is attempted by firing your own missiles to intercept the enemy rockets prior to them making a successful strike. Each of your bases to start with has a total of nine missiles.

The graphics, while fast, leave quite a lot to be desired. The movement of the track of missiles across the screen is accomplished in a weird eye-wrenching zig-zag fashion which detracts greatly from concentration. Also, the use of the numeric keypad to control the movements of the Cursor — by using the figures 7, 8, 9, 4, 6, 1, 2 and 3 — is laborious and time-consuming.

Much time — and many games — can be lost just by glancing down to try to discover which key you have been operating which successfully lost you your last city and two of your bases.

Missiles are launched by using the keys Z, X and C and once again, valuable time can be lost by glancing down to verify which one is being pushed.

MISSILE ATTACK

Maybe the answer is the introduction of a single joystick control — because it certainly doesn't work well using the keys referred to above.

The game itself is similar in all respects to the arcade *Missile Command*, and apart from the "wobbles" and the lack of full control, it plays quite well and fast.

The page of instructions is not held on the screen for long enough for the average reader to assimilate full details of the operating system. This blips up for a grand total of four seconds, and as a consequence of this, it does take a while to work out which keys are supposed to operate which function of the game.

There are no written instructions provided. Also the quality of the leaflet that came with the game is very poor.

For the sum of £13.95 it is not good value and I'm rather surprised that the price exceeds the £2.50 I expected. On second thoughts I think I'd prefer to continue visiting my local arcade!

On the whole it's a game which would only maintain a slight interest, you might even play it twice then shove it away and forget about it until you can overcome the cumbersome controls. It runs on a Pet, from Softprint, in New Malden.

Quality Software

Zx81-
VIC
INVADER

NEW! GALAXY INVADERS for the ZX81 in machine code for speed 20 invaders in 8 rows of 5. At least 4K RAM needed. Computer grade cassette and instructions. £3.00

Also 16 GAMES (Five games running in 16 RAM). Computer grade cassette and instructions. £3.00

SPECIAL OFFER - ZX81 16k RAM Pack - fully guaranteed with FREE Galaxy Invaders cassette only £37.00

NEW! VIC INVADERS in machine code for speed 16 full colour - 8 sound effects - no extra RAM needed. Computer grade cassette and instructions. £6.95

* Send a.s.p. for details, describing your system.*
Prices include VAT. Post and packing FREE in the UK.

* Mail Order Only *

ATOM

Adventures (12K):	
Atom Adventure (difficult)	£6.75
Pirate Island (very difficult)	£6.75
Write Your Own (tape & manual)	£5.75
Action Games (misc code, lower text):	
New Atom-man (Mode 4)	£6.75
Chaser (mode 0)	£3.75
Colour Invaders (mode 2a)	£3.75
Disassembler (3K)	£1.75

S.A.E. for details: **HOPESOFT**, Hope Cottage, Winterbourne, Newbury, Berks. RG16 8BJ

FREE FOR VIC OWNERS

Details of over 40 programs in the new catalogue from:

MR MICRO LTD, PO Box 24, Swinton, Manchester M27 3AL.

**a must for
your ZX81**

Authors:
Ian Stewart & Robin Jones

The reader-friendly guide to getting started with the Sinclair ZX81. Includes an introduction to looping and branching, graphics, subroutines, and debugging techniques, with over 50 programs designed to run on the standard 1K memory.

110 pages – Paperback £4.95 ISBN 0 906812 17 8

Published by: Shiva Publishing Ltd, 4, Church Lane,
Nantwich, Cheshire CW5 5RQ. Telephone: (0270) 628272

Order from your bookseller or fill in the coupon.

Please supply me with copy/copies of PEEK,POKE,BYTE & RAM. For 1st Class Postage please add 25p
 Price: £4.95 per copy. Cheques payable to Shaw Publishing Ltd.

NAME (Capitals please) _____
Full Postal address _____

For payment by Access/American Express

Card No. _____ Signature _____

REFRESH YOUR MICRO FOR 85p.

Do you feel you could get more out of your micro? Perhaps new software would improve things. Or how about expanding with new peripherals or more memory? Maybe you even need to upgrade to a better machine.

Then you can't do without Which Micro & Software Review, a brand new magazine which doesn't dabble in micros, it writes about nothing else.

We'll give you more software reviews (especially in the low-cost field) than any other magazine, with a unique buyers guide to software packages, that is updated every month. We'll tell you what's available for each machine, what's in the pipeline, what's right for you, where to get it, and what it costs.

We'll not stint on hardware coverage either. Not only will we publish the most extensive buyers guide section available but also reviews that take the machines apart. We'll compare cost against performance, point out compatibility problems, what's possible (and what's not), plus our best-buy opinions.

With all this you'll get regular round-ups of new peripherals, literature reviews, and problem pages written by two of the most re-

spected experts in the business. The first issue is out on April 15 from all good newsagents. Or use the coupon to take out your own subscription.

WHICH MICRO & SOFTWARE REVIEW THE A TO Z OF MICROS.

I would like to subscribe to the first 6 issues of Which Micro & Software Review. I enclose a cheque for £5.00, payable to 'Which Micro & Software Review'.

Name _____

Address _____

Send to: Which Micro Subscription Department, Competition House, Farndon Road, Market Harborough, Leicestershire.



HARD

ONE TOUCH WORDS

The Sinclair is based around a Z80 micro-processor, and for your money you will initially receive a startlingly small, light, box with a "Qwerty" keyboard on it, a power pack, leads for a television and cassette recorder and one of the best written Basic manuals for beginners to get to grips with.

The Sinclair Basic is very close to the Microsoft variety but does without such well-used command words as READ and DATA. It also has the time-saving notion of one-touch key words which come up on the screen when you need them.

An example is to touch the "P" on the keyboard after a program line number, then PRINT will appear on the screen, already spaced for you.

Beginners will find this confusing initially but with usage it becomes automatic.

MEMORY APLENTY

Memory capacity for the ZX81 is expanding and prices are coming down. Memotech now offers a 64K RAM pack for £79. Details can be obtained from the company at 103 Walton Street, Oxford, OX2 6EB. A variety of 16K RAM packs are available. JRS Software produces one at £35. D K Tronics sells a ready built pack for £42.95, and a kit for £32.95. It also produces a 2K pack at £15.95 and a 4K pack for £22.95.

Other firms which offer memory expansion packs include Byg Byte of 28, The Spain Petersfield, Hants, 16K for £42.95. And Audio Computers of 87, Bournemouth Park Road, Southend-on-Sea, Essex does a 16K for £33; 32K for £45; 64K for £73 and 128K for £123. Sinclair Research's 16K RAM pack costs £49.95.

The ZX81's membrane keyboard has proved a problem for some users. There are now several typewriter-style keyboards available. Fuller Micro Systems produce a keyboard which comes ready-built and costs £39.95. The ZX81 fits neatly inside the case, as does the power supply and memory boards with no leads hanging about outside. Details from Fuller Micro Systems, The ZX Centre, Sweeting Street, Liverpool.

DK Tronics also produces a keyboard, at £27.95. Redditch Electronics produces a keyboard in kit form for £20.50. A keyboard connector is optional and costs a further £1.95. D K Computer Keyboards produces a keyboard, at £28.95.

Voice recognition and music are possible on the ZX81. William Stuart Systems produces a speech recognition system for the ZX81 called Big Ears. It allows speech input through a microphone provided with the system, and costs £49. It also produces a music synthesiser which can be used to put out sound effects and music. Through its input and output lines the ZX81 can monitor a home security system and control a robot arm. Details can be obtained

In the spring of 1980, home computing was lifted out of the realms of the expensive hobbyist market and offered to a receptive public.

The Sinclair ZX80 was the reason and it was superseded the following year by the ZX81 model. Love or hate these machines, they were instrumental in putting computers at the fingertips of the public at a price they could afford — and utilising such house-hold items as a T.V. set and a cassette recorder.

Among the 81's limitations were a difficult to operate, touch-sensitive keyboard, crude graphics and it was launched with only 1K of memory and no printer facilities. It still sold 50,000 in the first three months and Sinclair ownership has now risen to 150,000 in the U.K. and 260,000 worldwide.

The printing and memory deficiencies were made up towards the latter end of last year and many other firms realised the potential for producing Sinclair peripherals and software. These names and addresses, are laid out below — if an address is missing it will be included elsewhere.

The ZX81 in kit form costs £49.95 and £69.95 assembled. It is built by Sinclair Research of 6 Kings Parade, Cambridge CB2 1SN.

from William Stuart Systems Ltd., Dover House, Billericay Road, Herongate, Brentwood, Essex, CM13 3SD.

The 50-character-per-second printer developed by Sinclair for the ZX81 allows the user to have hard copy of program listings or of program output. It costs £49.95.

It is useful to have a holder for the ZX81 and its peripherals, to contain all those loose wires. Various units are available including the ZX81 Workstation, a specially-moulded tray from Peter Furlong Products, 125 Catford Hill, London, SE6 4PR.

If you prefer a wooden workstation, try ZX Business Systems' £15 console. The address is 14 Brookfield Garden, Ryde, Isle of Wight.

ARE YOU GAME?

There is no shortage of software for the ZX81 from independent suppliers.

Many firms have set up producing both business and games for the machine but the standard of some of these is very poor.

Sinclair Research itself sells four tapes of programs which users have submitted to the firm. Included in the range is a tape containing six games, Orbit, Sniper, Meteors, Life, Wolf Pack and Golf. There is a junior education tape, and a business and household management tape. You can buy the tapes mail order from Cambridge based Sinclair for £3.95 each.

Many of the firms are small, one-man outfits which operate on a mail order basis. Prices for software range from £3 to £10 and the more you pay the better the quality tends to be.

The main firms involved in software production are: Bug Byte, 98-100 The Albany, Old Hall Street, Liverpool L3 9EP. This firm has about a dozen games on its books including versions of most of the popular arcade games like asteroids, space invaders as well as an adventure game. It also supplies a multi-purpose filing program, a machine code program, and a disassembler/debugging program.

Artic Computing, 396 James Reckitt Avenue, Hull HU8 0JA has a trio of adventure games for the ZX81 with 16K.

Premier Publications, 12 Kingscote Road, Addiscombe, Croydon, is a games supplier offering a wide range of generally good quality. The prices start at just under £4.

Quicksilver, 95 Upper Brownhill Road, Maybush, Southampton currently has three well presented games on the market. They are all versions of popular arcade games, space invaders, defender and asteroids and all cost £5.50.

Silversoft, 40 Empress Avenue, Ilford, Essex produces games for the ZX81 with a starting price of £4.95.

Macronics, 26 Spiers Close, Knowle, Solihull, West Midlands. This firm has nine games on sale which start at £3.95 going up to £6.95. Games included are space invaders, breakout and a music pack.

DK Tronics, 23 Sussex Road, Gorsestons, Great Yarmouth, Norfolk, offers centipede, a version of the recent arcade game, and a 3D labyrinth game. Prices start at £3.

Micro-Gen, 24 Agar Crescent, Bracknell, Berkshire, is a small firm supplying a couple of games for the ZX81, including a chess program, for £6.50.

Humorous games come from Automata, 65A Osborne Road, Portsmouth, Hampshire. Advertised as suitable for adults only, the series of three starts at £3.

J. K. Greville Software, 16 Park Street, Bath, Avon BA1 2TE produce a range of games with a lot of variety. Lowest price is £3.95.

Psi-on Computers, 20 Clifton Court, Maids Vale, London NW8 8HT, sells sci-fi fantasy games based on the adventure concept. Again the price is low at £3.85.

Other suppliers are: Axis, 71 Brookfield Avenue, Loughborough, Leics; J. O'Connor, 5 Tension Close, Bolton-Le-Sands, Lancashire; Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire, SK6 5BE; Gil-trole, PO Box 50, Rugby, Warwickshire, CV21 4DH; Michael Orwin, 26 Brownlow Road, Willsons, London, NW10 9QL; Second Foundation, 22 Bramber, Belgrave, Tamworth, Staffordshire, B77 2LL; Control Technology, 39 Gloucester Road, Gee Cross, Hyde, Cheshire, SK14 5JG; Timedata, 57 Swallowdale, Basildon, Essex;

CORE

JRS Software, 19 Wayside Avenue, Worthing, Sussex; Video Software, Stone Lane, Kinver, Stourbridge, West Midlands and Richard Shepherd Software, 22, Green Leys, Maidenhead, Berks.

A USER'S STORY

What's the user's view of the ZX81? Well! To set up the computer it is much like any other, fairly easy if you read the manual. It is when you come to type in a program that the trouble starts. The membrane keyboard is difficult to get along with, especially if you are used to a regular keyboard. Most people I have talked to heartily dislike it as well. I found the keyword system slow and awkward to use at first.

If you are new to computing don't bother to use the manual that comes with the unit. I found it easier to grasp the basic principles using a book like the **ZX81 Basic Book**.

A lot has been said about loading problems, but I have not encountered very many. For the record, I use a Ferguson 3T15 portable cassette player.

All sorts of hard and software is becoming available for the ZX81 and it must be said that some of it is of dubious quality. Buy software carefully, read the reviews published in this and other magazines.

This year will see a multitude of peripherals for the ZX81. Sinclair's own printer has just become available and various bits and pieces are coming on the market monthly. Joysticks, memory packs, sound boards and desk units.

I would recommend that you join a group of local users if there is a club in your area. The interchange of ideas is invaluable. Another source of advice, programs and reviews is the National ZX81 Users Club. For details send an S.A.E. to 44-46 Earls Court Road, London W8 6EJ.

The ZX81 represents good value for money. Sinclair's product support does leave a lot to be desired especially if you mail order. Order lead times are quite long.

WEALTH OF BOOKS

A wealth of books are now on sale to help you glean every piece of information about your Sinclair machine.

Many of them cover the same subjects, like programming your ZX81, machine language and the use of subroutines, but treat the topic in varying ways. We have included a selection with comments.

The Explorer's Guide to the ZX81 by Mike Lord of software house, Timateda. It covers programming aids, lists some games, applications, machine language and goes over the hardware side and expansion. It costs £4.95 from Timateda, 57 Swallowdale, Basildon, Essex. It claims to carry on where the Sinclair manual leaves off. And for £4.75, Timateda sells the **ZX81 Magic Book**.

Getting acquainted with your ZX81 by Tim Hartnell. It contains 80 programs for the unexpanded 1K ZX81 and is available in three editions. Numbers two and three cost £3.95 and £4.95 respectively from the ZX81 user club's magazine Interface by mail order. The address is 44-46 Earls Court Road, London W8 6EJ.

And 49 Explosive Games for the ZX81 by Hartnell costs £5.25 and contains listings to program into your Sinclair.

Stretching Your ZX81 to its Limits by Trevor Sharples and Hartnell is available from **Computer Publications**, Unit 3, 33 Woodthorpe Road, Ashford, Middx. It costs £8.95.

Mastering Machine Code On Your ZX80 is by Tony Baker and it costs £5.95. So is the **Gateway Guide to the ZX81 and ZX80** by Mark Charlton for £5.95. **34 Amazing Games for the 1K ZX81** by Alistair Gourlay is priced at £3.95. All are obtainable from Interface.

The ZX81 Basic Book by Robin Norman is from Newnes Microcomputer Books and the price is £4.95. He has also written a similar book for the older machine called **Learning Basic With Your Sinclair ZX80**, costing £4.95.

Peek, Poke, Byte and RAM is about Basic programming and includes information on graphics, setting up the hardware, logic, looping and branching, character manipulation, subroutines and debugging. It is by Ian Stewart and Robin Jones and costs £4.95 from Shira Publishing of 4 Church Lane, Nantwich, Cheshire CW5 5RQ.

Byteing Deeper into Your ZX81 by Mark Harrison gives programming tips and 37 programs to try out your newly acquired skills. Sigma Technical Press is the publisher at 5 Alton Road, Wilmslow, Cheshire. The price £4.95.

The ZX81 Pocket Book deals with machine code, decimal justification, and playing adventure games as well as giving hints and tips to get the most out of your computer. Phipps Associates at 99 East Street, Epsom, Surrey publishes this book by Trevor Toms and sells it for £5.95.

Books from Kuma Computers of 11 York Road, Maidenhead, Berkshire are: **Understanding Your ZX81 ROM** by Dr Ian Logan, costing £8.95.

The ZX81 Companion for £5.95. **The Sinclair ZX81 Programming for Real Applications** by Randle Hurley at £6.95. **Hints and Tips for the ZX81** by Andrew Hewson priced at £4.25. **Machine Language Made Simple** for £8.95 and **Not Only 30 Programs for the ZX81** at £6.95 but also **50 Rip Roaring Games for the ZX80/81** for £4.95.

Finally Making the Most of Your ZX80 by Tim Hartnell is obtainable through Interface and the following shops: Timateda, 37 Swallowdale, Basildon, Essex; Foyles Bookshop, Charing Cross Road, London WC2; Syntax Software, 96 Collinwood Gardens, Ilford, Essex; The Software House,

146 Oxford Street, London, W1; Mine of Information, 1 Francis Avenue, St Albans, Hertfordshire; Sinclair Research, 6 Kings Parade, Cambridge, Cambridgeshire CB2 1SN.

GRAPHICS JAM

The ZX81's graphics capability is very limited. In fact there are 20 graphics characters, and an inverse space, to play with. Although it has flicker free graphics the ZX81 is not viable for programming complex graphics displays in Basic. It is possible, but it takes up an awful lot of memory and makes animated graphics displays move sluggishly and jerkily. Machine code is the other possibility, but not a good alternative for Basic for the beginner.

There are several add-ons for the ZX81 that allow use of programmable and hi-resolution graphics. Quicksilver produce a programmable character generator at £26.00. It allows the user to program lower case letters, scientific notation, and space invader-type meemies to name just a few.

The character generator comes with a demonstration cassette of fast machine code routines. Quicksilver also produce a hi-resolution graphics board, at £85. This enables the user to produce very detailed screen displays, such as maps and almost perfect sine waves, with a high degree of accuracy. Details of both these products can be obtained from Quicksilver, 95 Upper Brownhill Road, Maybush, Southampton, Hants.

OK 'tronics produces a graphic ROM board at £29.95. This can be attached to the ZX81 by three solder connections. It allows the use of lowercase characters and also a variety of games orientated graphics characters.

Anyone who has tried playing a dexterity game on the ZX81 keyboard, will realise the value of joysticks. These are available from Micro Gen, Dept. VG, 24 Agar Crescent, Bracknell, Berks, at £30.00 each.

Light pens are useful when using menu driven programs. They make the selection of items on the screen easier, without having to use the keyboard to input replies. RD Laboratories produces the "Doodler" at £32.50. Details from RD Laboratories, (Dept. Y), 5 Kennedy Road, Dane End, Ware, Herts, SG12 0LU.

For users who have difficulty with loading, the Abacus Controller should provide a remedy. At £12 the controller switches from SAVE to LOAD by turning just one switch. Details from Abacus Electronics, 186 St. Helens Avenue, Swansea, West Glam. Finally a colour programmable character generator will soon be available from Fountain Computers of Dorbill Road, Rockley, Airedale, Hants. As we went to press it was still under development and a price had yet to be fixed. But for around £90 it will let you program any character or pixel in colour.

VoxBox

the product that speaks for itself!

Speech adds a new dimension to computing and the Mutek VoxBox, unlike most other systems, gives the capability to generate unlimited vocabulary speech from your computer. The unit is easily programmed via a parallel or serial port and a version is available for most popular computers. The principle of phoneme synthesis is used and, because phonemes are the "building blocks of speech", all English words and a large number of foreign language components may be easily constructed.

An increasing range of software is available to enable quick and easy sentence construction. The hardware is supplied complete and tested with inbuilt power supply and connectors for your computer.

Versions range from £65 for connection to PET, Apple, TRS-80, Video Genie, OSI, UK101, VIC and Acorn with no hidden extras for connecting leads, free demonstration software and excellent documentation.

Listen before you buy

We can honestly say the quality is nearly as good as human speech, so why not call us after 6pm and listen to our computer talking through VoxBox. You may place a credit card order or a request for further information after the message.

Mutek

Quarry Hill, Box, Wilts
Tel: Bath (0225) 743289

GAMES CENTRE

The Largest Selection
of Games in the World
including

VIDEO GAMES

22 OXFORD STREET · LONDON W.1.

(near Tottenham Court Road)

and also at

439 OXFORD ST. W.1.

(opposite Selfridges)

126 CHARING CROSS ROAD, W.C.2

(opposite Foyles)

184 REGENT STREET, LONDON W.1.

(2 mins from Oxford Circus)

MICHAEL ORWIN'S ZX81 CASSETTES

CASSETTE ONE for 1K ZX81

"I had your Invaders React cassette . . . I was delighted with this first cassette.
P. Rubythor,
London NW10

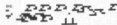
"I have been intending to write to you for some days to say how much I enjoy the games on 'Cassette One' which you supplied me with earlier this month. Please let . . . into the secret of your first time load every time!"
E.H., London SW4

Just two out of over 20 unsolicited testimonials.

INVADERS (1K)



PHANTOM ALIENS



BUG SPLAT



Cassette One 1K machine code programs:
React, Invaders, Phantom Aliens, Maze of Death, Planet Lander, Bouncing Letters, Bug Splat.

1K Basic Programs:
1 Ching, Mastermind, Robots, Basic Hangman.
PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16K.

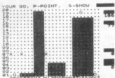
Cassette One costs £3.80.

CASSETTE TWO Ten games in Basic for 16K ZX81

AWARI



RECTANGLES



PONTOON



PENNY SHOOT



Cassette Two contains Othello, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette Two costs £5.

Recorded on quality cassettes, sent by first class post, from:
Michael Orwin, 26 Brownlow Road, Willesden, London NW10 9QL. (Mail order only please)

HILDERBAY LTD PROFESSIONAL SOFTWARE

If you don't believe that the Sinclair ZX81 can do real work, come and see us at the Computer Fair Exhibition, Earls Court (23rd-25th April) and the ZX Micro Fair, Central Hall, Westminster, London SW1 (30th April-1st May).

ZX81 & 16K SOFTWARE: Reviewed in "Your Computer" (Feb. 1982).

- * Payroll for up to 30 employees. Meets all regulations £25.
- * Stock Control Fast, big, and versatile £25.
- * Budget £15.
- * Critical Path Analysis Up to 500 activities £15.
- * VAT & Mortgage & Loan £8.
- * GOLD: A really good adventure, together with the intriguing "Pick a Word" £8.
- * RELIABLE 16K RAM Pack for the ZX81 £42.
- * BEAMSCAN: Beam analysis for architects and engineers £25.
- * APPLE II Payroll: £35.
- * HEWLETT PACKARD 9845B: Superspline (general purpose interpolation and tabulation).
- * MEMOTECH 64K Memopak £79.

DO YOU HAVE DIFFICULTY LOADING TAPES! We have the answers, and for well under £10.
Contact us for more details.

CROFTON PROFESSIONAL KEYBOARDS, MONITORS, VDU's
Prices include VAT, Post & Packing. COD Orders £2 extra.

TAPE HINT: Don't use the first 20 seconds of your cassettes — most tape problems are found near the ends of the tape.

HILDERBAY LTD
8/10 PARKWAY, REGENTS PARK
LONDON NW1 7AA

Enquiries for Hilderbay Ltd. will now be handled
by HILDCO LTD. Tel. 01-251 3090

ALSO ON ZX81 + 16K

Equation Pack: linear and quadratic equations, sets, equations of higher degree. £8.

Matrix Routines: the matrix statements of normal basic (MAT ...) £8.

Calculator Pack: the equivalent of RPN calculators. 40 operations and functions. £8.

Elementary Statpack: mean, variance, stand.dev., stand.err., covariance, corr. coef., anal. of variance, lin. regression £10.

Metric/Imperial/US Conversions: length, surface, volume, weights and measures, speed £6.

Triangles: complete triggs package £8.

Polynomial Evaluation: operations, zero's (int., real, complex) and Descartes £10.

Barcharts for Architects: a simplified version, takes away the tedious task of manually handling the problem £25.

Bank Account: calculate your bank charges whilst keeping your account £5.

Architects Programs: Barchart with S-curve/Dewpoint calculations N.B.S. on computer/Structural programs/etc. etc.

HILDCO LTD.
14, BRITTON STREET
LONDON EC1M 5NQ
Tel: 01-251 3090

GAAMES

CENSORED

THE NAUGHTY ONE

An adventure for (very) broadminded people. Pay your way through gambling dens, bars and houses of vice, be seduced or seduced, earn a slave, acquire part of your opponents' bodies.

Loose your money and borrow... this... there is no bank, only a pawnbroker, whose sole collateral will be some of your clothes! Gamble for the clothes of your opponents, force the pawnbroker to auction some clothes (preferably from other players...), be given some saucy tasks or dule some out.

Build a massage parlour and bankrupt (or underest) your opponents, if they are unlucky...

A mini version of this game is now available on cassette. The mini version on disk is much more expanded and contains in between other things 40 pubs and bars, 20 gambling houses, and also... no, we won't tell. Play it safe (for tokens) or play it hard. If you dare, that is...

A SPHINX COMPUTER GAME

THE SIGN OF HADRIN

Become familiar with dark age Britain and dig your way to a £1,000 treasure which is actually buried in this country.

A game which will tax the highest intelligence and needs real application to find the solutions.

It also includes a lot of outside activities. Follow the trail of this dark age magician and discover his tomb, with the real treasure in it.

A SPHINX COMPUTER GAME



GOLD

Find your way to more than forty rooms, collect the treasures and try to get out with them.

Very addictive. With the game come instructions on how to use a Memotech Memory Expansion. On the same tape: Pick a Word, a game of skill. Try and beat your children at it.

A HILDERBAY GAME



THE MAZE GAME

Go through three dimensional mazes which are unmaped and find your way to the exit. The game cannot become boring because the mazes change all the time.

A SPHINX COMPUTER GAME



GOLF

A step nearer to the real thing.

Played on actually existing courses, with a full selection of clubs. Contains all the necessary like weather, wind, and other atmospheric circumstances. You control yourself whether you slice or hook and you also determine yourself the impact on the ball.

Available in March, with full colour graphics.

A SPHINX COMPUTER GAME



THE SECRET CODES

Not a mastermind type of game at all. There are many coded texts on the disk (or cassette) which may be very difficult to decipher.

We undertake to pay £100.00 to the sender of the first complete listing of all the texts, listing which must be faultless of course.

Serious? HOGARIM MESHA STWARD TARAGON MOTASHIN SOMETIMES DRASHTIM MEGARAH SHAROSOMSH KIRIDANAM

A SPHINX COMPUTER GAME



ORDER FORM

GAME TITLE	cassette (16K)	diskette (40K)
ZX 81	Atari	Atari
THE NAUGHTY ONE (mini version)	9.50	9.50
THE NAUGHTY ONE (mini version)	—	24.50
THE SIGN OF HADRIN	—	29.50
THE SECRET CODES	8.50	8.50
THE MAZE GAME	8.50	8.50
GOLD (a Hilderbay Game)	8.00	8.00
GOLF (available March)	—	29.50

Circle items wanted.

Name

Address

.....

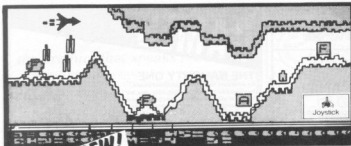
Town Postal Code

Remittance enclosed

V.A.T. is included. Please add 50p for P&P if order less than £10.00.

Send to

HILDCO LTD. 14 BRITTON STREET LONDON EC1M 5NQ



NEW! AIRSTRIKE For The ATARI 400/800

- INTRODUCING THE NEW 'SCRAMBLE TYPE' ARCADE GAME FOR ATARI COMPUTERS!
- SUPERB SCROLLING GRAPHICS WITH DAZZLING COLOURS!
- 100% MACHINE CODE PROGRAMME FOR ONE OR TWO PLAYERS!
- MULTIPLE SKILL LEVELS - FIGHT YOUR WAY THROUGH CAVERNS AND TUNNELS WITH ATTACKING MISSILES, FUEL AND AMMO DUMPS TO CONTEND WITH!
- AVAILABLE NOW: 16K CASSETTE £15.95 Plus 50p P & P
- 32K DISK £18.95

NEW TITLES: • CRYPTS OF TERROR-16K ADVENTURE • K-RAZY SHOOT OUT CARTRIDGE

• AMERICAN FOOTBALL-16K • CAVERNS OF MARS-16K

• COMPUTE! BOOK OF ATARI • SANTA CRUZ TRICKY TUTORIALS

NOW IN STOCK! ATARI TV GAMES PLUS ACTIVISION CARTRIDGES AT DISCOUNT PRICES! WATCH OUT FOR PACMAN AND DEFENDER!

NATIONWIDE MAIL ORDER SERVICE ON ALL PRODUCTS - SEND STAMP OR CALL NOW FOR DETAILS



For The ATARI 400/800

JAW BREAKER

16K CASSETTE/DISK £19.95 Plus 50p P & P.

This arcade game takes you to the candy store for a wild game of tag with some of the rowdiest playmates you'll find anywhere. If you can eat all the sweets, the bratty kids will stop bothering you and after a quick stop and a brushing of the teeth, it's off to the store for another day of sweets and tag.

- Full Color Hi-Res Graphics
- Automatically Escalated Skill Level
- Quick Moving Animation

ATARI
MICROCOMPUTERS



50 Newton St., Off Piccadilly, Manchester M1 2EA. Tel: 061-236 3083.

★ COMPUTER CHESS GAMES

Commodore VIC

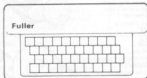
PLUS GAMES NOW IN STOCK!

ATARI
400 & 800

FULLER FD SYSTEM FOR ZX80/81

THE MOST VERSATILE SYSTEM FOR EXPANDING YOUR ZX

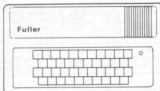
STANDARD KEYBOARD AND CASE



This splendid keyboard and case houses your ZX81 printed circuit board, which is simply screwed into place, the keyboard plugs into the ZX. You can now enter data with ease. The 40 key switch board is a custom unit not made up out of other manufacturers parts. The keytops are our own design and have the ZX Qwerty and functions foil printed onto them. Access to the user port, TV, MIC, and ear sockets are as per the ZX case.

Built keyboard and case £36.70 or £30.70 as a kit plus £2.10 postage and packing.

EXTENDED KEYBOARD AND CASE



The case is designed to house not only the keyboard and ZX but also our motherboard, power supply, RAM cards and two other boards, not necessarily of our manufacture. The injection moulded case measures 200 mm x 350 mm x 60 mm and houses a 42 keyswitch board, the extra keys can be assigned to other functions. The case is supplied with a "Power On" LED.

Built keyboard and case £39.95 or kit £33.95 plus £2.50 postage and packing. Motherboards £15.95 plus 80p postage and packing. 16k RAM board £35.95. 64k RAM board £79.95.

Keyboard Only Available!
Built £24.95
Kit £18.95 (+P.P. 80p)

Send SAE for details to:-
FULLER MICRO SYSTEMS, The ZX Centre,
Sweating Street, Liverpool 2.



MicroStyle

29 BELVEDERE, LANSDOWN ROAD, BATH

VISA



(0225) 334659.



INGENIOUS Genie I

All of the original GENIE SYSTEM plus:
★ Machine Language Monitor
★ Fitted Sound
★ Renumbr Command
★ Full Lower Case
★ Screen Print
★ 16K ROM 13K RAM

£295 + VAT

SEIKOSHA GP100A PRINTER

ENTIRELY NEW DESIGN.
UNBELIEVABLY LOW PRICE.
FULL GRAPHICS CAPABILITY.
CENTRONICS PARALLEL
INTERFACE. PAPER WIDTH
ADJUSTABLE UP TO 10".

£195.00 + VAT



PRINTERS

EPSON MX80 EPSON MX100
ANADEx PAPER TIGER T.E.C.
SCRIPTA MICROLINE 80.



ACORN ATOM

Sensational New Micro-Pack!
8K ROM 5K RAM, PSU included.
Colour fitted. Starter pack
software.

£170.00 + VAT



SHARP MZ80K

Full 48K Microcomputer with built-in cassette deck and monitor. THE ALL IN ONE COMPUTER - NO MESSY WIRES. Full range modular extensions available, printers, disk drives, etc.

£345 + VAT

GENIE II

The MacroComputer

Offering all the advantages of the Genie I system, with the benefit of advanced design for the professional user.

- ★ Terminal Routines
- ★ Facility to Upload & Download
- ★ Screen Print
- ★ 4 Definable Function Keys
- ★ Full Upper & Lower Case

Price £299

+ VAT

PROFESSIONAL EXTENSION KEYBOARD

for added efficiency of your ZX81. Plugs straight into existing ZX81 without desoldering. Simply unplug existing keyboard and plug in new one.

£25.00 + VAT

TANTEL PRESTEL ADAPTER

New AT PHA Numeric keyboard brings PRESTEL into your home. Converts black and white or colour TV.

£195.00

+ VAT

VIDEO MONITORS

All sizes and prices:
Black/white 9" **£90.00**
Black/white 12" **£85.00**
Green Screen 12" **£85.00**
Amber 9" **£95.00**
All Plus VAT

Complete range of VIDEO GENIE PERIPHERALS

can now be linked to your TRS80 for only **£18.00** + VAT with the new 3023 BUS CONVERTOR

Plus!

Aculab Floppy Tapes

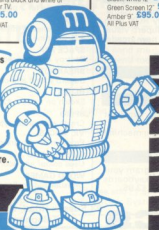
Special Offers - Ring and find out.

Vast Computer Book Selection.

Just a sample of what's in store for you!

ZX81 Software. TRS80/Video

Genie Software. Diskettes.



Post to: MICROSTYLE, FREEPOST, 29, Belvedere, Lansdown Road, Bath BA1 1FP

Please send me further details on the following, and your special offers:

CV1

Name _____

Company _____

Address _____

Tel: _____



THE ZX81 POCKET BOOK

A STACK OF GAMES
AT YOUR FINGERTIPS

BOOKS

136 PAGE BOOK

Programs

- * ZX81 ADVENTURE.
City of Alzan
Create your own
BALL AND BUCKET
PAINT-A-PIC
DIGITAL CLOCK
- * SKI RUN
Plus 20 more Programs

Articles

Using machine code
Efficient Programming
String Manipulation
Plus more

**ONLY
£5.95
inc p.p**

* REQUIRE 16K RAM

BARCLAYCARD

VISA

Access

PHIPPS ASSOCIATES

(Mail Order Dept D)

99 East St, Epsom Surrey, Tel 03727 21215

quoting your credit card No. 24hr phone service
Air Mail Europe plus 70 p Elsewhere plus £1.70

Also available

***Adventure**

GREEDY GULCH
MAGIC MOUNTAIN
PHARAOH'S TOMB

ALL 3 for £5.00 inc vat & p.p

***ZX81 Pocket book
Cassette**

All programs & subroutines
from the book on 1 tape

**£5.00 inc vat
& p.p**

VIC 20 SOFTWARE

QUALITY SOFTWARE FOR THE 3.5 VIC 20 COMPUTER

DEFLEX

Fast-moving action and spectacular colour and sound effects add to the excitement of this original game. Deflect the rapidly moving ball to hit stationary or moving targets. Records top ten high scores. 20 skill levels.

ROX

At last an original and compulsive space game. Defend your moon base from the deadly ROX from space. Increasing levels of difficulty and superb visual and sound effects make this the greatest new arcade-type game since Space Invaders.

DEFLEX and ROX on same cassette £4.95

ROX III

8K version of a popular 3.5K game.

3D LABYRINTH

VIC version of the Labyrinth game using excellent hi-res graphics.

Both program run hi-res graphics on Basic machine plus 8K of RAM. Both for £5.95.

SOFT KEY DEFINE PROGRAM

Written in machine code, allows you to program your function keys with 24 of the most popular keyboards i.e. FI=RUN etc. Runs on any memory size £3.95.

TEN SUPERB 3.5 PROGRAMS — ALL TEN FOR £6.95

GEM+

Create and store your own custom character sets.

TANX

Tank battle for 2 players.

MUSIC

Encode tunes in three-part harmony up to 130 notes long on 3.5k machine.

SPACE ZAP

Destroy alien spacecraft attacking your space station.

BREAKOUT

Superb sound and colour effects.

HI-RES

Sketch on a 128 x 128 pad using keyboard or joystick.

SPIRO

Create spirograph-type patterns in hi-res.

VIC TRICKS

Program demonstrates the special uses of VIC chip registers.

MASTERMIND

Uses colour and sound to the full.

WORD GAMES

Unusual and challenging game for 2 or more players.

dk'tronics

23 Sussex Road, Gorleston, Great Yarmouth, Norfolk.
Telephone: Yarmouth (0493) 602453



ZX80/1

Price **WAR!**

£37.95
inc VAT

ZX KEYBOARD FULLY CASED WITH REPEAT KEY



Fully cased keyboard £37.95
Uncased keyboard £27.95
Keyboard Case £10.95

This is a highly professional keyboard using executive buttons as found on top quality computers. It has a repeat key and comes complete in its own luxury case. This is a genuine professional keyboard and should not be confused with toy keyboards currently available on the market.

16K RAM PACKS MASSIVE ADD ON MEMORY

£32.95
inc VAT

WHY WAIT TO PAY MORE?

**FAST IMMEDIATE
DELIVERY**

POST TO
Dept CVG4,
Kayde Electronic Systems,
48/49 Exmouth Road,
Great Yarmouth,
Norfolk NR30 3DP.
Tel (0493) 57867

All products include VAT, are fully built and tested and come with a complete money back guarantee.

Please send me	Ram pack/s	£32.95 each
Please send me	cased keyboards	£37.95 each
Please send me	uncased keyboard	£27.95 each
Please send me	keyboard case	£10.95 each
I enclose £		
Name		
Address		
.....		
.....		
Please add £1.50 P/P and make cheques payable to Kayde Electronic Systems.		

ADVENTURE

DYNACOMP

FOREST FIRE: Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire, while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in starting penalties. Life-like variables are provided to make FOREST FIRE very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty. **24K (C) £15.99**

THE RINGS OF THE EMPIRE: The Empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. The exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players. **16K (C) £15.99**

INTRUDER ALERT: This is a fast paced graphics game which places you in the middle of the "Deadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems. **16K (C) £15.99**

CHOMPELO: CHOMPELO is really two challenging games in one. One is similar to NIM; you must bite off part of a cookie, but avoid taking the poisoned portion. The other game is the popular board game REVERSI. It fully uses the Atari's graphics capability, and is hard to beat. This package will run on a 16K system. **16K (C) £15.99**

SANTA CRUZ/TRICKY TUTORIALS

DISPLAY LISTS: Teaches you how to alter the screen format of small and large text on the screen together and high and low res graphics. **16K (C) £9.95**

HORIZONTAL/VERTICAL SCROLLING: Enables graphics or text to be moved up, down or sideways. You could move only the text on the bottom half of the screen or create a map and scroll smoothly over it. **16K (C) £9.95**

PAGE FLIPPING: Learn how to have the computer draw the next page you want to see while you are still looking at the previous page then flip to it manually. A very useful program. **16K (C) £9.95**

BASICS OF ANIMATION: This program shows you how to animate simple shapes (with sound) using Print & Plot commands and also has a simple graphics game you can play with. **24K (C) £9.95**

PLAYERMISSILE GRAPHICS: This program shows you how to create a simple shape called a player, then takes you through over 25 examples to create a complete business application and a small game. **24K (D) £15.95**

SOUND: Unless you have spent many hours experimenting with the four voice channels of the Atari, you will learn a lot from this one. With many examples of special sound effects. **16K (C) £9.95**

THE GRAPHICS MACHINE: Type in simple commands like line, box, circle, polygon, fill and save screens to get nice pictures, you can save and retrieve in seconds. Several demos are included in this great program. **48K (D) £15.95**

PLAYER PIANO: Turns your keyboard into a mini piano. Create your own songs, save on cassette or disc, up to 400 notes in memory. **16K (C) £9.95**

KIDS PROGRAM 1: Three programs on one tape. Maths: test your child's maths skills. Dialogue: talk to your computer. Lost Treasure: search over a small island looking for a treasure. **16K (C) £9.95**

KIDS 2: Three more programs for your children. Spelling Bee, input and test those monthly tests, jumble words, learn to give a lot of fun. Follow the computers instructions and stop yourself laughing. **16K (C) £9.95**

ATARI PROGRAM EXCHANGE

EASTERN FRONT (1941): Stunning graphics make this the best war game yet on a micro. Fine scrolling, as many as 16 colours, battle simulation. **16K (C) £30.25**

CAVERNS OF MARS: Fly your attacking spacecraft right into the bowels of an enemy Martians base, blasting away at fuel dumps and Martian fighters as you twist and veer from asteroid, cavern rock islands. The combination of stark haunting subterranean graphics and the fast-paced continuous battle action makes this one of the most exciting games on a computer. **16K (C) £30.25**

THORN EMI

SNOOKER & BILLIARDS: Full British championship rules and practice options for these popular games. **16K (C) £19.95**

DARTS: Over 300 games options based on the pub game of darts for up to 4 players. **16K (C) £19.95**

ARCADE PLUS

GHOST HUNTER: Rid the mansion on Huckleberry Hill of Ghosts. An exciting, fast action, arcade type game using excellent sound and graphics. **16K (C) £19.95**

SPECTRUM

GALACTIC CHASE: A fast action, arcade type game employing hi-res colour graphics. Wave after wave of alien ships must be destroyed in a "Galactic" type game. The display is excellent. **16K (C) £16.95**

ADVENTURE by Scott Adams

ADVENTURELAND: You wander through an enchanted world trying to recover the 13 lost treasures. You'll encounter wild animals, magical beings, and many other perils and puzzles. Can you rescue the Blue Ox from the quicksand? Or find your way out of the maze of pit? Happy Adventure... **24K (C) £16.50**

PIRATES ADVENTURE: "Yo ho ho and a bottle of rum..." You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island. Can you recover Long John Silver's lost treasures? Happy sailing, matey. **24K (C) £16.50**

MISSION IMPOSSIBLE ADVENTURE: Good morning, your mission is to ... and so it starts. Will you be able to complete your mission on time? Or is the world's first automated nuclear reactor doomed? This one's a well named, but it's not as magic, but plenty of suspense. Good luck. **24K (C) £16.50**

VOODOO CASTLE: Count Crito has had a fendish curse put on him by his enemies. There he lies, with you his only hope. Will you be able to rescue him or is he forever doomed? Beware the Voodoo man... **24K (C) £16.50**

THE COUNT: You wake up in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here, and WHY did the postman deliver a bottle of blood? You'll love this ADVENTURE. In fact, you might say it's Love at First Byte... **24K (C) £16.50**

STRANGE ODYSSEY: Marooned at the edge of the galaxy, you're stumbled on the ruins of an ancient alien civilization complete with fabulous treasures and unearthly technologies. Can you collect the treasures and return or will you end marooned forever? **24K (C) £16.50**

MYSTERY FUN HOUSE: Can you find your way completely through the strangest Fun House in existence, or will you always be kicked out when the park closes? **24K (C) £16.50**

PYRAMID OF DOOM: An Egyptian Treasure Hunt leads you into the dark recesses of a recently uncovered Pyramid. Will you recover all the treasures of more likely will you join its countless slaves for that long eternal sleep? **24K (C) £16.50**

GHOST TOWN: Explore a deserted western mining town in search of 13 treasures. From rattlesnakes to runaway horses, this ADVENTURE's got them all just remember, Pander, they don't call them Ghost Towns for nothing. (Also includes new bonus scoring system!) **24K (C) £16.50**

SAVAGE ISLAND — PART 1: WARNING FOR EXPERIENCED ADVENTURERS ONLY! A small island in a remote ocean holds an awesome secret. Will you be the first to uncover it? NOTE: This is the first of a larger multi-part ADVENTURE, it will be necessary to purchase additional packages to complete the entire Adventure. **24K (C) £16.50**

SAVAGE ISLAND — PART 2: After struggling through Part 1, you have the consolation of knowing it's half over. This concludes this two part ADVENTURE it requires you have completed #10 and received the password to start #11. **24K (C) £16.50**

GOLDEN VOYAGES: The King lies near death in the Royal Palace — you have only three days to bring luck the alair needed to rejuvenate him. Journey through the lands of magic fountains, sacred temples, stormy seas, and gold, gold, GOLD! Can you find the elixir in time? **24K (C) £16.50**

ANGLE WORMS/CROCODIL DIVERSION: Each player attempts to prevent his rival's A small island in a remote ocean holds an awesome secret. Will you be the first to uncover it? NOTE: This is the first of a larger multi-part ADVENTURE, it will be necessary to purchase additional packages to complete the entire Adventure. **24K (C) £16.50**

MOUNTAIN SHOOT: Pick your powder and pick your angle as you plug away over the mountain. Great sound and superb colour. Has special limited powder version too for greater challenge. **16K (C) £12.50**

SUNDAY GOLF: Neither rain, nor snow, nor threat of hail, will keep the Sunday golfer from this course. Grab your clubs and head for the fairways. This course is never closed. **16K (C) £12.50**

LUNAR LANDER: Colour graphics, 4 voice sound. Using the player missile graphics capabilities of the Atari, you must guide the module carefully across the landscape. Multi skill levels. Excellent graphics. **24K (C) £12.50**

DEFLECTION: A fast moving arcade game with simple rules and many skill levels. Will keep you and your kids occupied for hours and hours. Early reports indicate this program has addictive qualities. Also including Simon. **16K (C) £12.50**

STAR TREK 3.5: By Lance Nicklaus. Classic Star Trek with Action Sound Effects. 3-D galaxy made up of 192 quadrants, including stars, planets, black holes and a pulsar. Amazing visual displays etc. **32K (C) £16.50**

NEW NEW NEW

CRYPTS OF TERROR: An excellent graphics based adventure game. Explore 50 crypts, slay the monsters, find the ring and the key to the next level. An excellent, absorbing game employing great colour graphics. **16K (C) £29.90**

MURDER AT AWESOME HALL: Question suspects, search for clues, find the murderer. As you wander through the doors of Awesome Hall, trying to solve the murder of the Colonel. Good graphics and excellent game features. **16K (C) £14.90**

To: CALISTO COMPUTERS LTD, 119 JOHN BRIGHT STREET, BIRMINGHAM.
PLEASE ACCEPT MY ORDER FOR THE FOLLOWING PROGRAMS:-

1.
 2.
 3.
 4.
 5.
- Cheque No. for £..... enclosed.
Please debit my credit card ACCESS/VISA No.
Phone orders welcome on 021-632 5458. Signed

Calisto Computers Ltd.

SPECIALISTS IN MICROCOMPUTERS AND SOFTWARE
119 JOHN BRIGHT STREET, BIRMINGHAM B1 1BE
Telephone: 021-632 5458

A PRACTICAL DIGITAL ELECTRONIC KIT FOR ★ LESS THAN £20 ★



SUITABLE FOR BEGINNERS

NO SOLDERING!

Learn the wonders of digital electronics and see how quickly you are designing your own circuits. The kit contains: seven LS TTL integrated circuits, breadboard, LEDs, and all the DIL switches, resistors, capacitors, and other components to build interesting digital circuits; plus a very clear and thoroughly tested instruction manual (also available separately). All this comes in a pocket size plastic wallet for only £19.90p inc VAT and p&p. This course is for true beginners - the only extra you need is a 4V battery.

- needs no soldering iron.
 - asks plenty of questions, but never leaves you stuck and helpless.
 - teaches you about fault-finding, improvisation, and subsystem checking.
- This course teaches boolean logic, gating, R-S and J-K flipflops, shift registers, ripple counters, and half-adders. Cheque with order to:

Cambridge Learning Limited, Unit 145, Rivermill Site, FREEPOST, St Ives, Huntingdon, Cambs, PE17 4BR, England.

or tel 0480 67446 with credit card details

Cambridge Learning

HENRY'S COMPUTER KIT DIVISION

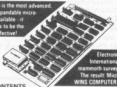
404 EDGWARE RD, LONDON W2 1ED

TEL: 01-402 6822

RETAIL SALES
& DEMONSTRATIONS

MICROTAN 65

Microtan 65 is the most advanced, powerful, expandable micro-computer available - it also happens to be the most cost effective!



Electronic Today International hold a mammoth survey of kits. The result: Microtan 65 WINS COMPUTER CLASS!

MICROTAN 65 CONTENTS

High quality, plated thru hole printed circuit board, solder resist and silk screened component identification, 6502 microprocessor, 1K monitor TANGBU. Now with V-Bug, 1K RAM for user programme, stack and display memory, VDU alphanumeric display of 16 rows by 32 characters. MICROTAN 65 system file binder, 156 page, bound, users hardware software manual with constructional details and sample programmes. Logic and discrete components to fully expand MICROTAN 65. The MICROTAN 65 kit has won widespread acclaim for its superb presentation. We pay attention to detail!

KIT FORM £59.00 + £10.35 V.A.T., total £79.35.

MICROTAN 65 ASSEMBLED AND TESTED.

Specification as above, but assembled and fully bench tested by our technicians.

£79.00 + £11.85 V.A.T., total £90.85.

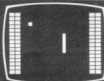
YOU MAY DEDUCT £10 FROM MICROTAN 65 KITS AND ASSEMBLED UNITS LISTED HERE ONLY FROM OUR

DELIVERY EX-STOCK PAID LIMITED QUANTITY AVAILABLE

TANGERINE • TANGERINE



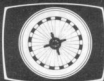
1. FRUIT MACHINE:



2. BRICKDOWN:



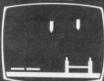
3. BLOCKADE:



4. ROULETTE:



5. HANGMAN:



6. TARKUS:

NEW!



only £9.95
inc. VAT & Post & Packaging

BEELINES VIC 6 SIX VOL 1

The Games System in a Cassette!

At last! A really professionally produced piece of games software that will guarantee you hours of fascinating thrills on your VIC computer.

The first volume of the 'Beelines VIC 6' gives you exciting, colour, arcade quality games that make full use of the power and display quality of the VIC.

The 'VIC 6' is attractively priced so that no VIC user need be without it, and it is available exclusively from Beelines. Just send £9.95.

So fill in the coupon, or phone us with your credit card number, and the 'VIC 6' will be yours within days!



BEELINES (Bolton) LTD

FREEPOST (No stamp required) Bolton BL3 6YZ

Ansaphone (0204) 385299

Reg. office: 124 Newport St, Bolton BL3 6AB. Dealer enquiries welcome.

Please send me:

Qty.	Item	Price
	Beelines 'VIC 6' Vol. 1 at £9.95	

I enclose cheque/P.O. ☐
OR: Please debit my

Access 5224

Barclays 4929

Expiry Date:

Name:

Address:

Code:

Let date:

If you call on lines, we can - we will ship to approved account holders on invoice of firm order.

Delivery free within mainland UK.

Access and Barclaycard and Visa.

Telephone answering machine for 24hr. day.

credit and orders 0204 385299.

Freepost: Beelines, FREEPOST, Bolton BL3 6YZ.



THE FIRST FULL FEATURED COLOUR
COMPUTER AT UNDER £200!!



*Sound *Colour *5K Memory Expandable to 27K *Standard PET Basic *Full size typewriter Keyboard *Graphics *Plug-in memory expansion *Low-priced peripherals.

THE FOLLOWING ITEMS NOW AVAILABLE

CODE:	
VIC I	VIC 20 computer at £189.95 incl. VAT
VIC II	VIC cassette unit at £44.95 incl. VAT
VIC III	VIC 3K RAM cartridge at £29.95 incl. VAT
VIC IV	VIC 8K RAM cartridge at £44.95 incl. VAT
VIC V	VIC 16K RAM cartridge at £74.95 incl. VAT
ARFI	Arfon Expansion Unit at £97.75 incl. VAT

**SPECIAL FREE OFFER
3K RAM CARTRIDGE
WITH EVERY VIC 20
COMPUTER ORDERED**

**PLUS FREE GAMES TAPE WITH
EVERY CASSETTE UNIT ORDERED.**

Offer Ends April 30th 1982

437 Stoney Stanton Road,
Coventry, CV6 5EA
West Midlands
Tel: (0203) 86449

IBEK
SYSTEMS

VIC I	£189.95 + £3.45 P & P	VIC II	£44.95 + £1 P & P
VIC III	£29.95 + £1 P & P	VIC IV	£44.95 + £1 P & P
VIC V	£74.95 + £1 P & P	ARF I	£97.75 + £5 P & P

Name:

Address:

Please charge my Barclaycard/Access No.

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

Signed:

Or telephone order.



ACORN
COMPUTER

ELTEC SERVICES LTD
THE ACORN SPECIALISTS

Hardware

ACORN ATOMS with new keyboards Full range in stock
BBC Machine MODELS A & B + accessories Stock expected
March

Full colour monitors (as used by the BBC)	£299.00
Green screen "Prince" monitors 12in	
(High Res 24MHz)	£126.00
NEW GPIIQA Printer (improved print, wider paper)	£247.25
ATOM Centronics type printer cable	£18.40
6522 VIA interface chip	£9.99
74LS244 Buffer	£3.22
Printer socket for ATOM	£3.60
4K Floating point ROM	£23.00
NEW ACORN 96K single disk pack	£343.85
Disk Buffer Pack & Connector	£11.75
BBC ROM SETS for ATOM	£57.50
ATOM Word pack ROM	£30.00
UTILITY ROMS Ext. Basic:Toolchest:RS232	from £28.00
ATOMICALLY Ripped (for business)	£39.10
UTILITY ROM SWITCH (any of 4 ROMS-softswitch)	£57.50
Extra Memory — recommended	per 1K £3.20
ATOMFILE	£142.00

Software

SOFTWARE		
Games packs 1		each £11.50
Games pack 10 (10 games for min. ATOM)		£11.50
Soft VDU new character set design		£11.50
Maths Pack 1, Maths Pack 2		each £11.50
ATOM DATABASE		£11.50
UTILITY PACK 1 Dissembler + Fast		
CDS + Renumber		£11.50
PEEKO COMPUTER Simulates a Micro on the screen		£11.50
ATOM Business Cassette by J. Phipps		£8.79
BUG BYTE CHESS (very good version)		£9.00
BUG BYTE 747 FLIGHT SIMULATOR — EXCELLENT!		£8.00
BUG BYTE GALAXIANS		£8.00
ATOM Desk diary, Address book & Planner		£11.50
ATOM ADVENTURES Dungeon, House, Intergalactic		£11.50
ATOM SYNTHESISER (very creative)		£11.50
ATOM LIFE PACKAGE. A fast version of life		£11.50
ATOM FORTH Cassette		£11.50
ATOM FORTH User Guide		£6.00
ATOM WORD Tutor Pairs, relations, sentences. Suitable for Primary school children		£11.50
ATOM INTRODUCTORY PACK — 4 cassettes		
1. Interactive Teaching		
2. Financial planning, Minicals & sales		
3. Household Phonebook. Learn to touch type		
4. Games, Attack, Connect 4, Breakout, Memory & Mastermind		£23.00

Books

The BBC's "THE COMPUTER BOOK"	£6.75
The NEC "30 HOUR BASIC"	£5.50
Practical Programmes for the BBC Computer & the Acorn Atom by David Johnson-Davies	£6.95
ATOM Business Book by J. Phipps	£8.95
ATOM Magic Book	£5.50
Getting Acquainted with your ACORN ATOM	£7.95
Basic Programming on the BBC Microcomputer by Neil & Pat Crver	£5.95

ELTEC SERVICES LIMITED

231 Manningham Lane,

Bradford BD8 7HH

Tel: Bradford (0274) 491372

accept Access & Barclaycard by mail or p

Add 50p UK p&p for all items EXCEPT large hardware, eg Computers, Monitors etc then add £3.00 for a Securicor delivery.

ANGLO AMERICAN SOFTWARE CO

TRS-80 ≈ ATARI ≈ PET ≈ APPLE ≈ VIC ≈ ZX81 ≈ BBC

We know what it is like out there, because that's where we came from. Before we decided to become software entrepreneurs, we were just like you enthusiasts searching through magazines for the ideal mail order software source. What we hoped to find was a single entity that offered an ultra-wide selection for our micro-computer. That pre-selected only the best of many similar sounding programs that reached the market every month. That could give us personal assistance with the purchase-decision process, and that stood behind its products. When we couldn't find it we decided to become it. So **ANGLO-AMERICAN SOFTWARE CO WAS BORN.**

Please state clearly the program(s) you require. Include your name, address & machine type + memory size. Prices include VAT, postage & packing.

<p>OIL TYCOON</p> <p>What would it be like to be an oil producer. Find out with this action packed simulation as you try to become an oil tycoon. Explore for new wells, get reports, name your own price for oil — but don't get too greedy or beware. The game involves strategy and chance. You could end up as one of the wealthiest men in the country or the bankrupt victim of too many oil spills. You will find OIL TYCOON both challenging and exciting.</p> <p>PRICE £9.95p CASSETTE</p>	<p>MASTER DIRECTORY</p> <p>Wasn't it yesterday you threw the cat in to the washing machine because you couldn't find where you had put the last Adventure game you had saved or was it that you gave your mother-in-law the leftover curry because your three year old had mixed up all your data disks and now you don't know which one is which? Well cheer up MASTER DIRECTORY is here. The M.D. is a storage program that reads the files on your disks, stores the name, extension and even records the free space on each disk. All you do is number your disks. You can use it alphabetically or search for name and ext search for free space. Store 5000 files or 320 disks. Requires one disk drive.</p> <p>PRICE £21.00p DISK.</p>	<p>AIR FLIGHT SIMULATION</p> <p>Instrument takeoffs and landings are no picnic, ask any pilot. This computer simulation is sure to keep you on the edge of your seat. You begin with a full tank of fuel and a flight plan to learn simple takeoffs and landings. Pay attention to your instrument panel; too steep a bank and your air speed will drop like a stone... so will your plane. It's about as close to the real thing as you can get this side of the runway. Fun for all the family when you learn to do acrobatic manoeuvres.</p> <p>PRICE £9.95p CASSETTE</p>
<p>DUNGEON OF DEATH</p> <p>Your quest is to search for the Holy Grail where you descend through 12 levels, find the Holy Grail and return to the surface. The Grail is guarded by SMAUG the most fearsome monster of all and ten lesser breeds. You can only survive by using all the powers at your command. You can cast magic spells, drink potions that may or may not help you find items to help you fight the monsters. Step softly in the darkness. Treasure or sudden death is only a foot-fall away in the DUNGEON OF DEATH.</p> <p>PRICE £10.75p CASSETTE</p>	<p>THE FLYING CIRCUS</p> <p>Is a package covering biplane to modern day planes. These seven programs offer you the daring realism of flight.</p> <ol style="list-style-type: none"> 1. AIR FLIGHT 2. NIGHT FLIGHT 3. AIRMAIL PILOT 4. MOUNTAIN PILOT 5. O'HARE (air traffic controller) 6. APPROACH RADAR 7. JET FIGHTER PILOT <p>A great combined flying package. Try to master the lot.</p> <p>PRICE £25.00p DISK</p>	<p>SANTA PARAVIA & FIUMACCIO</p> <p>Fancy being a Mrs. THATCHER — well with this program you will come as near to it as you will ever be. Perhaps I should acquaint you with the domain. It is not a wealthy area but riches and glory are there for the aware. You will have to worry about the serfs requesting more grain; if they don't get it they may flee. There is the weather as well — if it is good so will the crops be. You may find you have to increase the tax. You may also wish to build a new palace. To measure your progress, the official cartographer will draw you a map so as to see how to plan your strategy. A very entertaining game.</p> <p>PRICE £10.50p CASSETTE PRICE £14.25p DISK</p>

Send 75p for full catalogue

(Refundable against purchase)

ANGLO AMERICAN SOFTWARE CO

138a Stratford Road,
Sparkhill,
BIRMINGHAM, B11 1AG
021-771 2995



To place orders quote your Access no.

★ PROGRAM OF THE MONTH ★

SPACE SHUTTLE Save £4.50p

5.3 million pounds of thrust sent the space shuttle COLUMBIA into orbit. Now on-board computers will help to bring her safely, and gracefully back to earth. **SPACE SHUTTLE** puts you in the command pilot's chair of the first reusable space vehicle and until commercial flight becomes available this is the closest you will get. We feel this is one of our best programs.

PRICE £17.00 CASSETTE

★ SPECIAL OFFER PRICE £12.50 ★

DEALER ENQUIRIES WELCOME

COMPUTERS FOR PEOPLE



VIC 20 The expandable colour computer from Commodore. Comes complete with leads and manuals £197. Program Recorder £44.95. VIC and Recorder together £240.

ATARI 400 A new generation micro for family entertainment and education. Amazing sound and graphics direct from your colour T.V. Atan 400A £299.95. Power supply £3.48. BASIC cartridge £36.40. Program Recorder £30.



NEW Atan 400PCP. Unique system includes 400A, Program Recorder, Power supply, BASIC cartridge, Atan BASIC and 'Games for the Atan' books, all leads and manuals £389.



ATARI 800 The advanced, expandable computer with all the features needed on a business computer plus a great colour, sound, graphics and speed. £399.95 with free dust cover. Cassette recorder £30. Disk drive £345.

CALL IN IF YOU CAN, OR USE OUR EXCELLENT MAIL ORDER SERVICE. Same day despatch. Please write your order carefully or phone us for information/order form. Callers welcome. Open 9.00-6.00. Closed Thursday.



BUY FROM THE PEOPLE WHO CARE. All prices inclusive of 15% VAT.



All our equipment is covered by the unique Personal Computer Palace Service Scheme, which provides free installation, one year parts and labour guarantee and optional maintenance contracts.

PCP

PERSONAL COMPUTER PALACE

4-6 CASTLE STREET, READING, BERKSHIRE.

Telephone: (0734) 589249

ZX81 WORKSTATION..



**NEW MODELS
FULL
KEYBOARD
& PRINTER
VERSIONS
AVAILABLE**

... is a stylish and ergonomic plinth for the ZX81. It raises and tilts the TV to avoid eyestrain, holds the 16KRAM in place and hides the wiring and power supply. This very professional unit costs £15, a built-in power switch is £3, plus postage at £1.50, inc. VAT. Peter Furlong Products, 125 Catford Hill, London SE6 4PR. Callers by appointment, please. Tel 01690 7799. Visa, Access.

From West London's mail order specialists:

**ONLY
£240**

Incl. cassette deck

+ FREE GAME

+ FREE

DELIVERY

VIC-20

SPECIAL OFFER

Order the superb VIC-20 and cassette deck at £240 (incl. VAT!) and get a FREE game ("Breakout" or "Stunt Cycle") worth £7.99 - and delivery is free, too!

We stock all VIC-20 software, peripherals, paddles, etc - including the full Stack and Arton range.

The best microcomputers from leading makers (Apple, Commodore, etc) plus peripherals, printers, software, games, books - and all at low prices! Order today from the mail order specialists - send coupon with cheque (or phone your Barclaycard no). Delivery in 28 days or money-back option.

Please supply 1 VIC-20 & Cassette Deck & "Breakout"/"Stunt Cycle" (state which required)

NAME: _____

ADDRESS: _____

TWICKENHAM

COMPUTER CENTRE LTD

72 Heath Rd Twickenham Middx TW1 4BW (01-892 7886/01-891 1612)

From West London's mail order specialists:

Latest special offers:

48K Apple	£768
12in Green monitor	£115
12in Amber Phillips monitor	£135
Epson printer	£399

ALL PRICES INCLUDE VAT

TWICKENHAM

COMPUTER CENTRE LTD

72 Heath Rd Twickenham Middx TW1 4BW (01-892 7886/01-891 1612)

PERSONAL COM

LONELY Genie I Microcomputer, early eighties, with large peripheral family but currently unattached, would like to meet interesting, attractively packaged software, Genie or Tandy specification, for programming, problem solving, entertainment and long-lasting friendship. Reply in confidence. Box No RS232.

ANSWERING MACHINES

Office certified

LON
intel
vated

ATTI
wish
may
man

SO
mei
(m
tion
hum

MAI
to
wai
wis



ingenious ...but lonely!

Buying your first Genie I microcomputer is just the start of a long and enthralling adventure, for it won't be long before you will want to expand your system with some of the wide range of peripherals which make up the complete Genie System.



Firstly there is the

Expansion Box,

which immediately expands your Genie's capacity to 32K RAM, and up to 48K RAM if required. It can be connected to 4 disk drives, a printer, RS232 interface or S100 cards.

Then there is the

Printer,

a compact unit with 80 column, 5 x 7 matrix print-out, which connects to your Genie through the Expander, or via the Parallel Printer Interface.



The Disk Drive

gives you greater storage capacity and full random access file handling, with the option of double-density through a special adapter. New Dual Disk Drive now available!

Finally, there is Genie's very own

12" Monitor,

a must if you want to let the rest of the family watch their TV. in peace!

Available in B & W or green tube.



The supreme advantage of the Genie I system is its compatibility with the TRS 80, which means that literally 1000's of pre-recorded programs are already available, just waiting to be plugged into your Genie!

The recent improvements in the Genie system, including Extended Basic, sound unit and machine language monitor, make it the ideal system for the committed hobbyist, and an excellent and easy-to-use educational tool.



SPECIAL TECHNICAL GENIE

HOT - LINE ON 0629 4995

for all your technical advice and service back-up on any aspect of the Genie system direct from the experts!

Please send me FREE, 16 page colour brochure on the Genie Computer System. I enclose 25p postage.


Name

Address

Telephone CVG-82

LOWE
electronics

Chesterfield Road,
Matlock,
Derbyshire DE4 5LE.
Telephone: 0629 4995.
Telex: 377482 Lowlee G.



Adventure into ATARI With Maplin...

Through a thousand galaxies of time and space... From across the ravaged oceans...
From dungeons of fantasies... After battles with enchanted dragons...
Come the fabulous Atari computers... the ultimate creative game computer!

Command a space-ship through the dangers of deep space where alien contact is inevitable or take your chances as you adventure through forbidden lands in search of secret treasures or play Space Invaders, Asteroids, Missile Command, Super Break-out, Shooting Gallery, Jawbreaker etc, etc, just like they are in the arcades, but in the comfort of your own home.
Or discover the superb Atari teach-yourself programs that will help you learn: Programming, French, German,

Spanish, Italian and Touch-Typing. Or just use the Atari to create your own programs - the Atari makes it so easy to generate really incredible graphics. It's all part of the magic of Atari.

When you decide to buy Atari, you're choosing one of the most advanced personal computers there is.

When you decide to buy Atari from Maplin, you've made the best choice of all... because Maplin support Atari...totally!

Write or phone for your Maplin/Atari information pack NOW!

MAPLIN

Maplin Electronic Supplies Ltd P.O. Box 3, Rayleigh, Essex. Tel: Southend (0702) 552911/554155

Demonstrations at our shops NOW
See Atari at 284 London Road, Westcliff-on-Sea, Essex.
Tel: (0702) 554000 and at
159-161 King Street, Hammersmith, W6
Tel: 01-748 0926